Creating Communities of Place

NJOSP
GROWTH SIMULATION MODEL
VERSION 2 USERS GUIDE

Document #123

NEW JERSEY OFFICE OF STATE PLANNING
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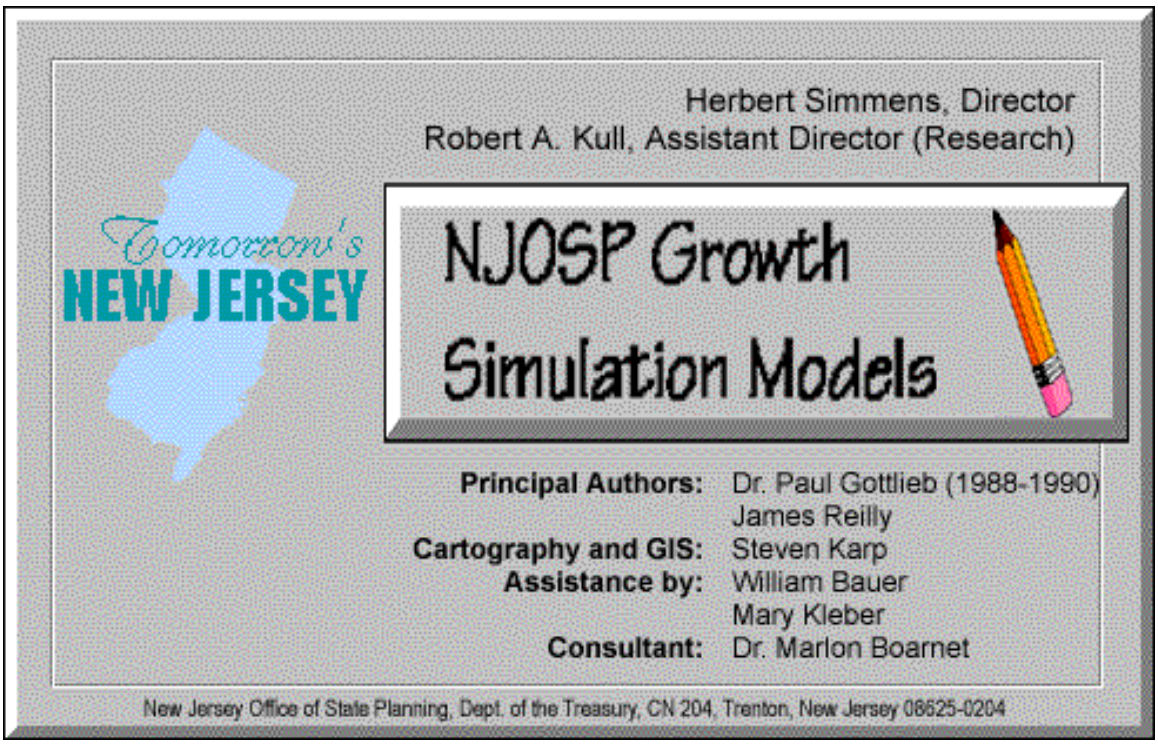

Cover graphic designed by Bob Kull

NJOSP GROWTH SIMULATION MODEL
Version 2.0
Users Guide

NJOSP Technical Reference Document #123
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Technical Assistance

If you have questions that are not answered by this User's Guide, please contact:

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Information about the model is can also be found at OSP's Web site:
HTTP://www.state.nj.us/osp/ospmodel.htm

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Preface

This release of version 2 of the *NJOSP Growth Simulation Model* in 1997 represents the culmination of nearly ten years of statistical research and computer modeling by the New Jersey Office of State Planning. The simulation assists you in visualizing the implications of various growth and development policies that may or may not be in the current *State Development and Redevelopment Plan* (State Plan). The model is a series of spreadsheets designed to run on a Microsoft Windows-compatible desktop or laptop computer using Microsoft Excel 5.0 or 95. Version 2 of the model features an improved interface and more user-selectable options. Version 1 of the model was adapted by the Center for Urban Policy Research at Rutgers University for its use in preparing the *Impact Assessment of the Interim State Development and Redevelopment Plan* in 1992. We hope you find the NJOSP model easy to use, and that you find it to be a useful planning tool both during the current round of Cross-acceptance and in the process of reviewing your existing and proposed land use plans.

The NJOSP Growth Simulation model defines your growth goals in the vernacular of the *State Development and Redevelopment Plan* and allows you to quickly test alternative policy driven scenarios. It also incorporates several spatial (geographic information system) and other advanced databases to ensure that data inconsistencies are uncovered and corrected and that growth projections respect resource limitations.

By changing any of the assumptions used in running the model (by using the input screens and dialog boxes described in this Users Guide), you create an *alternative scenario* of future conditions. In its current form, the Growth Simulation Model provides a wealth of data that you can use to inform decision making processes involving alternative scenarios. For example, the model helps you to:

- Estimate how regional (county and larger) changes in population and employment may affect population, housing, employment, land consumption and demands for infrastructure in each municipality.
- Estimate the capital costs of future local roads, public sewers and public school facilities, as well as general State and municipal operating costs, associated with each growth scenario.
- Evaluate the effects of designating different numbers and scales of State Plan centers within a region.
- Evaluate the effects of using different design guidelines for centers.
- Evaluate the effects of implementing large scale park acquisition, farmland preservation and other programs and techniques that make less land available for development.
- Estimate needs for specific types and price ranges of housing among municipalities based on projections of household sizes and income levels.

Your use of the model will also enable the Office of State Planning to:

- Improve calibration of the model statewide, based on current land use trends.
- Develop more accurate assessments of long range infrastructure needs and State Plan impacts at regional (county) and Planning Area (urban, suburban, rural) scales for use in the State Plan's Infrastructure Needs Assessment and Impact Assessment.
- Link the Growth Simulation Model with models used by State and regional agencies in transportation, air quality and water supply planning.

As you become more familiar with the model, you may invent many more uses of the model that we encourage you to share with us and with other users. However, there are limitations on *appropriate* use of the model that must be kept in mind:

- Growth forecasts produced by the model should be viewed as “reasonable”, not perfectly accurate*. The purpose of the model is to test alternative land use policies, not forecast growth.* In fact, the model begins by asking the user to select or enter a growth forecast to be used by the model. As future events can change the accuracy of this selected forecast, it is more accurate to admit that growth forecasts for any given year are just (educated) guesses, and that they really are a convenient way to represent *capacities* for growth that a Trend or Plan scenario is to accommodate at whatever year that amount of growth is realized.
- At present, the model is based on municipal scale data and regional assumptions. Therefore, the results are most valid in comparing groups of municipalities, rather than the performance of an individual municipality.
- While it is among the most comprehensive of models at this scale, the NJOSP Growth Simulation Model is based on a limited number of factors. Therefore, all of the projections produced by this model are approximate, not exact forecasts, and are best compared with other projections produced by the model for other scenarios.
- Although the model estimates capital costs for public sewer treatment and collection systems (which may include privately owned small scale systems), it does not currently estimate the costs for individual septic systems for new, non-sewered houses. These costs, which tend to range from $3,000 to $10,000 per dwelling unit depending on the local soils and bedrock, can be estimated by the user from the number of non-sewered dwelling units output from the model.
- To a large degree, the effectiveness of a preferred plan scenario is largely a question of how that plan will be implemented in the future by your agency, local municipal planning officials and by State agency infrastructure planners. The objective of the program is to assist you in establishing a more informed plan of action that you feel more confidently can be implemented.

Many of the features in version 2 have been developed because of comments from planners who helped to test the model and other planners who have reviewed model results. In fact, recent comments of version 2 have prompted us to begin work on a version 3 release which will enable the model to run in Excel 97[1], and will make the model more sensitive to detailed characteristics for individual centers. A component to estimate capital costs for septic systems for new development will also be incorporated into the sewer cost model. We hope to have this update available in early 1998. We are also developing programming code that will allow the model to produce generalized maps of growth by communicating model generated results to standard desktop mapping and geographic information system software. We will continue to act on the principle, and our very strong belief, that the only way this model can be an increasingly useful and relevant planning tool is for you to tell us of:

- your experiences with using the model,
- your ideas for improvement, and
- your planning needs which the program is not addressing.

We look forward to developing and using this model with you in the months and years ahead.

[1] Excel 97 does not recognize the macro language programming code from Excel 4.0 and earlier that continues to be used in parts of Version 2 of the Growth Simulation Model. As a result, the model will not run properly using Excel 97.

I. Welcome

The purpose of the New Jersey Office of State Planning (NJOSP) Growth Simulation Model (GSM) is to allow counties, and other regional planning agencies, to explore the effects that various land use policies would have on future growth patterns and to provide some insight of selected future costs resulting from these growth patterns. This computer model brings to the user various data sets, including the best available geographic information system (GIS) inventories, as well as carefully researched statistical relationships about how growth occurs.

One could view the model as a visually unattractive version of SimCity[2], since it really is 'Sim New Jersey' without the entertaining animation of growth. Like SimCity©, the model does not produce an optimum plan, but rather challenges you to develop your own plan. (Unlike SimCity , you do not necessarily run the risk of being voted out office if you construct a poorly performing plan scenario with the NJOSP program.)

Our hope is that you will 'play' with this program. On a Pentium computer you can run a Plan scenario with all impacts in about 30 minutes. (If you are using a 486, you might want to run the model on a spare computer, or run the model overnight - Plan with impacts takes several hours.) Running this program cannot break any computer hardware, so do not be afraid to use it. Nothing you do can cause the program to crash. If crashes occur, they are caused by programming errors NJOSP has made. We hope the software is relatively 'bug' and error free, but if something goes wrong, NJOSP will be only to glad to learn of the 'bug' or error, fix it, and give you an improved copy of the program.

Running the model is not hard; in fact we hope it is easy to use. Evaluating the results produced by the model is not so easy. You will have to invest some time and thought; both to determine if the results are reasonable (Do various data sets in the model have to be revised by the user? Is something simply wrong with the model's forecasts?) and to evaluate why results are produced which may be considered undesirable or contradictory to the scenario's policy intent. This evaluation process is the key to using the model, and because it is so important only you can make this evaluation. By using the program, you can explore a very large number of growth policies for your county or region. Evaluating the results of the different simulations and using this knowledge to develop 'improved' policy scenarios will help you to discover a policy-driven regional growth pattern ("Plan") that you feel is beneficial.

Finally, we hope that you present your selected Plan (or Plans?) to the State Planning Commission. If State Development and Redevelopment Plan (SDRP) policies appear to be at odds with your plan, bring it to the State Planning Commission's attention. Only by engaging in this policy dialog can the SDRP be made more compatible with your vision.

[2] SimCity is a registered trademark of Sim-Business.

II. System Requirements and Installing the Model

System Requirements

You need a computer running Windows 3.1, Windows 95 or Windows NT as its operating system[3]. If you have Windows 3.1 or Windows 95, the model will use all of the system resources (well at least most of them) when it runs. This means that when you run the program it will fully occupy your computer and you cannot do any other work on that computer while the program is running. If you use Windows NT (and have sufficient RAM), you can both run the model and do your normal work on the computer while the model is running.

Robust computers run the model faster. The model will not run on a computer using a 286 or older processor. If you have a 386 and about 8 MB of RAM, the model will run very slowly indeed - think in terms of days not hours[4]. If you have a 486 with 16MB of RAM, Trend runs in about an hour, but Plan still takes several hours. On a Pentium 90, with 24MB of RAM, Trend runs in about 15 minutes and Plan can be run (including impacts) in 35 minutes. If you have sufficient Random Access Memory for your operating system, you probably have enough to run the model. However, it is very strongly suggested that you have **at least** 16 megabytes (MB) of RAM (24MB if you are using NT). The more RAM in your machine, the faster the model (and most of your other programs) will run.

Your system must have either a CD ROM or some other type of large volume removable drive (such as a 100 MB Iomega ZIP drive). Without these devices the program cannot be conveniently loaded on to your machine. (If this is a real problem, please give OSP a phone call so we can load the program for you.) The program takes about 60 MB of space on your hard drive. You need to have at least that much free space on your hard drive (free space does not include space reserved for a system temp or system swap file). If your hard drive is mostly full, this program and most other programs will not perform very well. You can delete files on the drive to make space or you can add another hard drive. If space on your hard drive is a problem or a concern, you might consider purchasing an Iomega ZIP drive (they cost about $150.) or a similar removable device. These products are drives, much like your 3.5 inch disk drive, but they use diskettes that hold 100+MB of information. Unlike your 3.5 inch disk drive, these products perform (read and write) fairly fast.

Your computer should to be connected to a printer. This can either be a network printer or a personal printer. (As long as you can print from any of your programs, the model will use your printer.) If you are not connected to a printer, you can still use the program.

[3] If you are a New Jersey Government agency, and you only have a Mac, let OSP know. We might be able to revise the code to run on your machine.
[4] OSP does not recommend using a 386 computer.

Without a printer (or simply if you care to) you can choose to save forecasts and other reports to file and then review them using Excel.

Finally, you need to own a copy of Microsoft Excel and have it installed on your computer. If you do not own a license for Excel, you can purchase it by itself or as part of Microsoft Office. (The model will not work with other spreadsheet programs.) You need to install Excel Version 5.0 or, if you have Windows 95 or NT, you can choose to install Excel 95 (version 7). THIS VERSION OF THE PROGRAM WILL NOT WORK WITH EXCEL 97 OR THE EXCEL PROGRAM PROVIDED BY OFFICE 97. NJOSP will release a version that works on Excel 5 through Excel 97 in 1998.

Installing the Growth Simulation Model

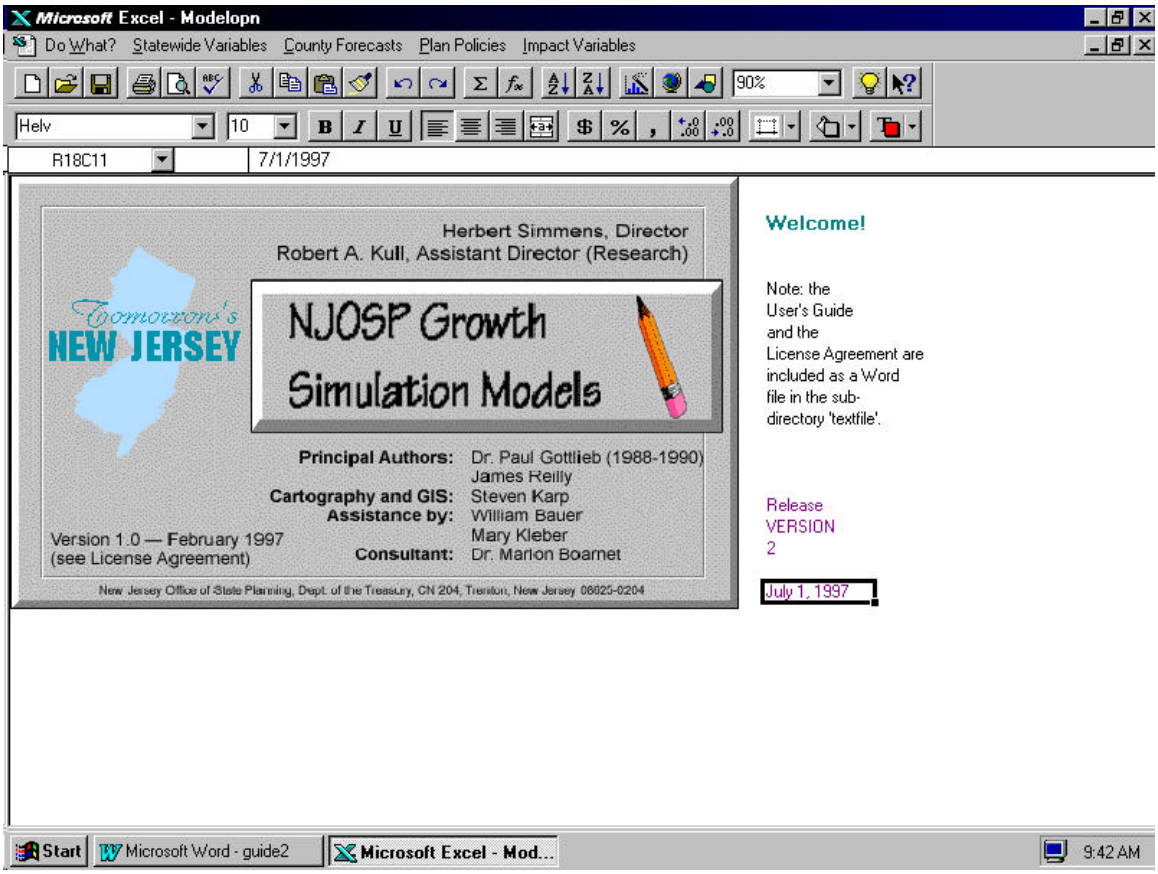
NJOSP can provide you with copies of the model on either a ZIP disk or on a CD. (The model is included in the State Planning 1997 CD-ROM in the OSPmodel directory folder.) If you are a public agency in New Jersey, or a not for profit regional land use agency serving New Jersey, and do not have either of these devices NJOSP can install the model on your computer for you. However, it will be difficult for you to upgrade the model without one of these devices.

Just so you know, you are not actually *installing* this model - just copying it to your hard drive. The model does not modify or change in any way any part of your operating system. The model will not interfere with any other program you have on your computer.

To install the model:

1. Create a Directory (folder) on your C: Hard Drive. Name the directory (folder) **OSPmodel**. Be sure there is 60MB of free space on this drive.
2. Insert the CD (or ZIP disk) into its drive.
3. Use File Manager (Windows 3.x) or either My Computer or Explorer (W95, NT) to copy the program files from the OSPmodel directory on your CD or from your ZIP drive to your Hard Drive's OSPmodel directory.
4. Remove the CD (or Zip Drive).
5. Reset the Properties of all files located in your OSPmodel directory (folder).
    a. Launch File manager or My Computer or Explorer.
    b. Select all the files in OSPmodel. Use the Edit/Select all command.
    c. Select Files, then properties. You will note that the files are identified as archive and read only. Change these settings by clicking on their check mark boxes. Select OK or Apply.
    d. Reset the properties of the files in the subdirectories in OSPmodel. OSPmodel contains both files and subdirectories (more folders). In turn, click on each of these subdirectories (folders) and repeat the steps in c. above.
6. Close file manager, Explorer or My Computer.

7. Launch Excel.
8. Open the file c:\OSPmodel\startup.xlm. (You may not see the suffix .xlm, depending on the version of Excel you are using.)
9. (Hopefully) The model is now ready for use and you should see the following screen.



If you have had a problem, Call, write, FAX or e-mail NJOSP for assistance. Transmit your questions, complaints, ideas, quibbles, and nice comments (always appreciated) to:

Jim Reilly
New Jersey Office of State Planning
33 West State Street PO 204
Trenton, NJ 08625
609-292-3589
FAX 609-292-3292
Reilly_J@tre.state.nj.us

Send Email to Jim Reilly

III. Overview of the Model

Tasks Performed by the Model

The NJOSP model can perform any of the following tasks.

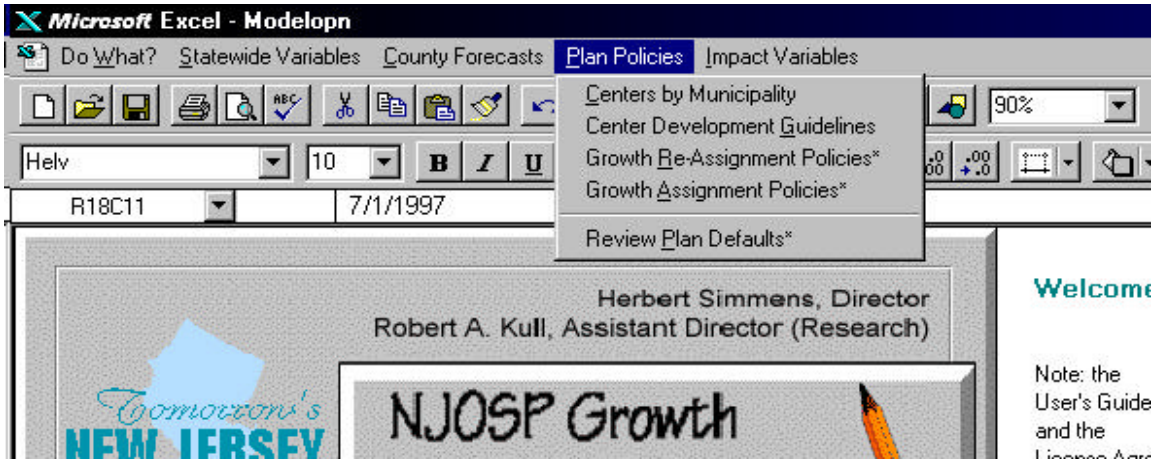
1. It can produce an estimate of total County Housing Need.
2. It can produce an estimate of Trend Growth (population and employment for each municipality). The Trend task also has calibration programs which allow you to adjust municipal population and employment assignments so that they more accurately reflect local development conditions.
3. It can produce an estimate of municipal growth that is likely to result from various Plan policies.
4. It can estimate costs for local roads, public sewers, public schools, as well as municipal and State current expenditures and acres of land consumed for each of an infinite number of growth scenarios.

In addition, the model can save a record of the variables from any Trend or Plan scenario and reload them (restore a scenario) for later use.

Using the Model - It is Only a Part of the Planning Process

You begin to use the program by generating a Trend Growth forecast that you feel is reasonable. Only when you have a reasonable Trend forecast should you begin to run the Plan portion of the program. The reason for this sequential procedure is that Plan primarily alters Trend growth assignments. (Stated another way, a fairly large portion of Trend growth probably will not conflict with Plan policies.)

You create alternative Plans by selecting different *Plan Policy* variables.



You can “create” new centers by selecting *Centers by Municipality*. You can specify different development densities and job to household ratios for the centers by selecting *Center Development Guidelines*. You can choose different policy concerning where growth is to be re-assigned from and where growth is to be re-located (e.g. take it from non-sewered areas of the municipality and assign it to centers). You create different ‘plan’ scenarios by changing these plan variables.

One advantage from using the model is that it assists you to develop growth simulations which you can compare to other growth simulations and to Trend (a "leave things continue as they have been" scenario). Another advantage is that the model allows you to identify a preferred growth distribution using the vernacular of the SDRP. Using the model should assist you to visualize the affects of SDRP policies.

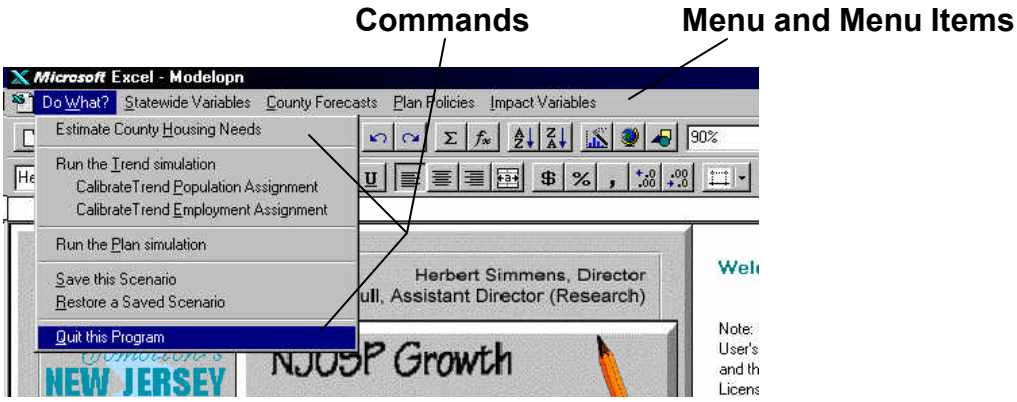
Despite these advantages, the model is strictly a tool for you to use to identify a beneficial regional plan. Neither your computer nor the NJOSP Growth Simulation Model can think. Only you (and the others involved in your planning process) are thoughtful enough to evaluate one scenario from another. Therefore, the big argument for using the model is that it frees you to spend more time weighing the values (planning) and minimizes the time you need to spend collecting data and generating hypothetical alternatives.

III. How to Use the Model

How To Start and Stop the Model

The easiest way to start the model is to start Excel and then OPEN the startup file. When this file opens, the program will run automatically from there on. If you prefer you can also create an icon which will start the program (and Excel) from either Program Manager (Windows 3.1) or from the opening (start) screen in either Windows 95 or Windows NT. Refer to the HELP instructions in your version of Windows for instructions.

You stop the program by selecting the menu item *Do What?*, and then scrolling to the command *Quit this Program*". Choosing this option stops the model, closes all files and stops Excel.



Although it is NOT a very good idea (because of your operating system) to reboot or otherwise quit the program while it is running, such an action will not affect the NJOSP model PROVIDED that you ***never*** choose to save any of the files from the program as part of closing the program. If for some reason you MUST quit the program during a run, simply press ESC once or twice. Depending on what the program is doing, this action will sooner or later produce an error message. Choose to Halt the program, and then close Excel without saving any of the files.

First - Prepare the Model for Your Use

During the development and testing of this program, selections have been made for each of the program variables. These (default) selections are NOT intended to suggest a preference. (Where one data set is more complete, you will be explicitly informed.) So the first step in using the model is to review each of the *Statewide* and *County Forecast* menu items and to specify variables that you prefer.

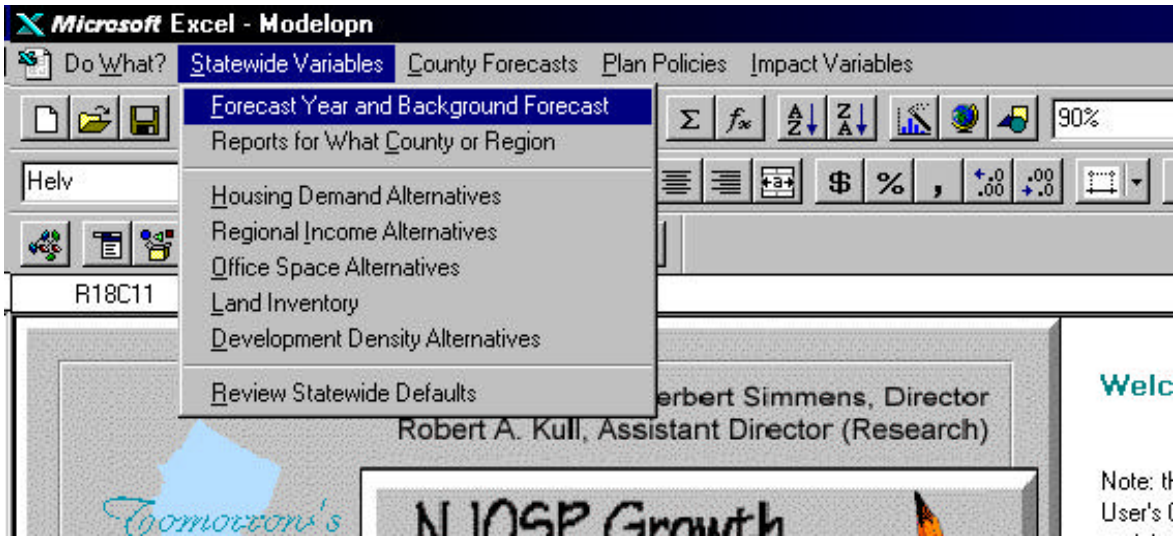
When you click on any of these menu items, the item expands to show you the commands that you can select. When you scroll (actually you drag your mouse) to one of these commands and then release your mouse button, you start a small program. These command started programs either presents you with a dialog box (or dialog boxes) or worksheets for you to select or enter variable values (or they initiate one of the program tasks, such as running a Trend simulation). Hopefully each dialog box or input worksheet provides you with sufficient text information for you to make your selection. However, some of these variables are rather technical. If you do not understand the variable, call OSP. (If certain variables are found to be confusing, corrections to the program will be made.) When selecting from a list, remember that the highlighted variable is the variable selected for use in the program. Once you make your choice, you click on the OK button in the dialog window.

Selections made by you are used by the model (forever) until a new variable is selected. There are two ways to review the selected variables. You select the appropriate commands and you will see that the value, currently selected for use in the program, will either be highlighted (dialog box) or will be identified on the input worksheet. You can also choose to print a report which will show you the selected variables. (This option is not available for input worksheets, but you can choose to Print a copy of these input worksheets when you create or review them.)

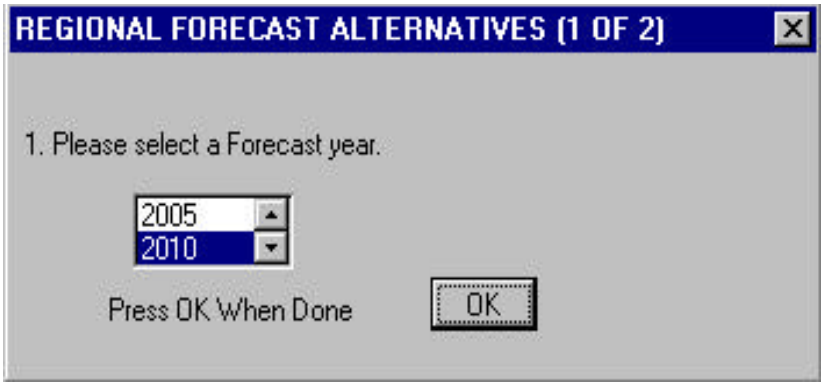
Selecting Statewide Variables

Let’s begin by reviewing the Statewide variables.

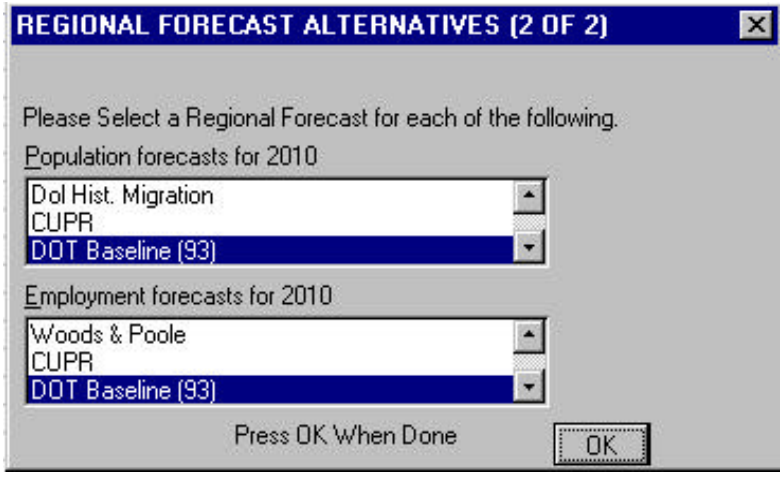
A. Forecast Year and Background Forecast



With this selection two dialog boxes are presented.

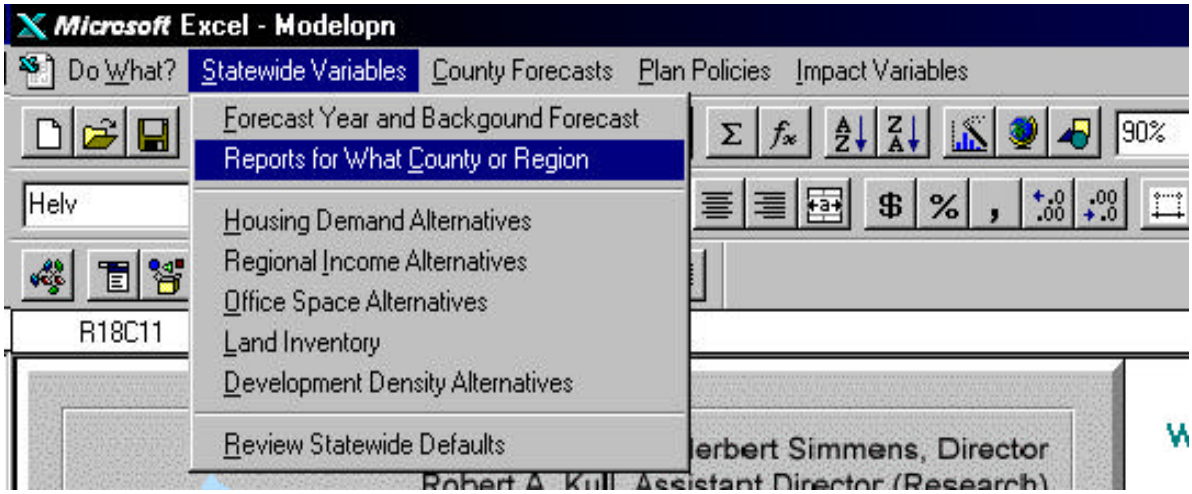


This dialog box selects the forecast year to be used in all program calculation. Five year interval forecast years are presented, starting in 1995 and ending in 2020.



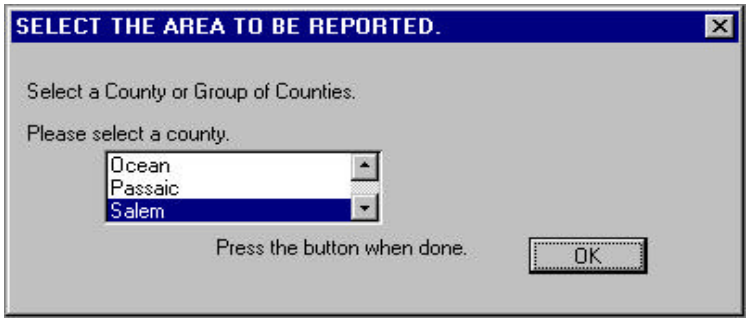
The program actually produces forecasts for each of the municipalities (or counties) in the State every time it runs. Selecting a background population and employment forecast[5] provides the program with default county forecasts (unless you enter your own county forecasts). The background population forecast also established a default cohort forecast that the model uses in the event that your own forecast lacks a cohort table. The background employment forecast provides information on the types of jobs in the forecast year.

B. Reports for What County or Region



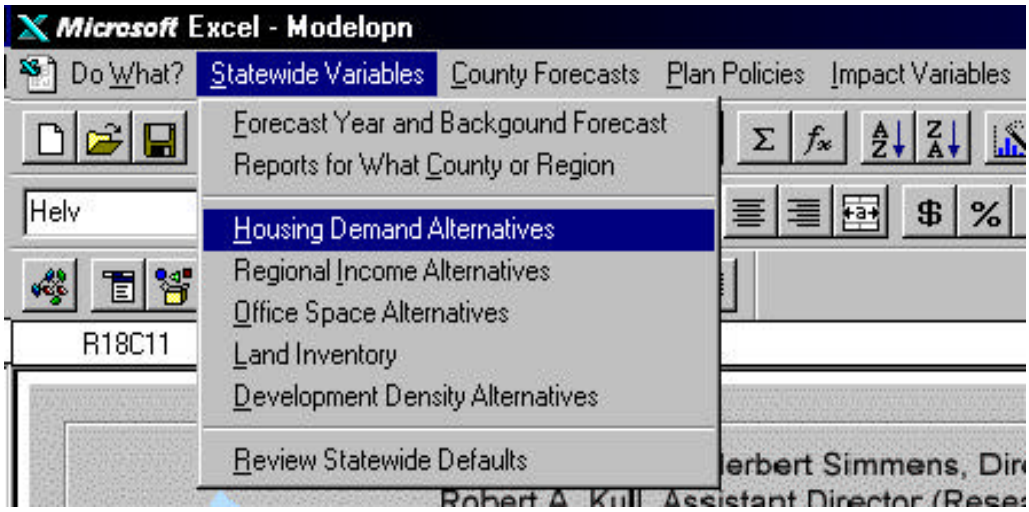
Selecting this command produces a single dialog box. In the example shown below, Salem county is selected for use in the model. This means that all report and all input worksheets will only show Salem County information. You can select any of the 21 counties, or any of the MPO regions. You can also select Statewide coverage, however this option only allow you to save (to file) reports, since they would be too large to print.

[5] Appendix A displays each individual forecasts used in the model.

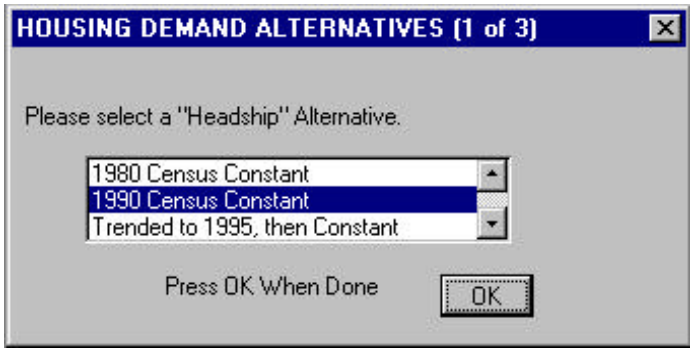


C. Housing Demand Alternatives

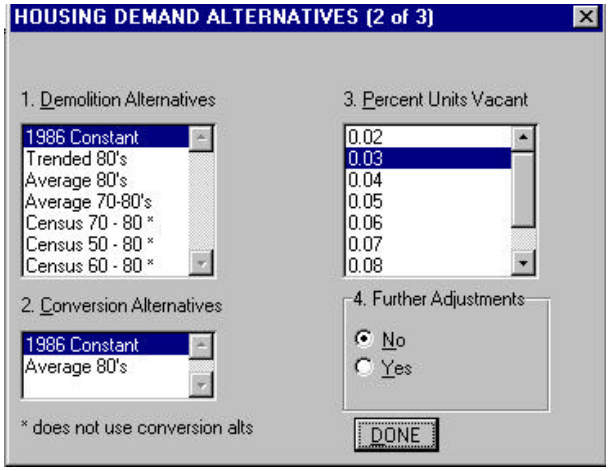
Variables presented with this command affect the demand for housing and determine how many of the 1990 houses remain available for use in the forecast year.



Three dialog boxes are produced.

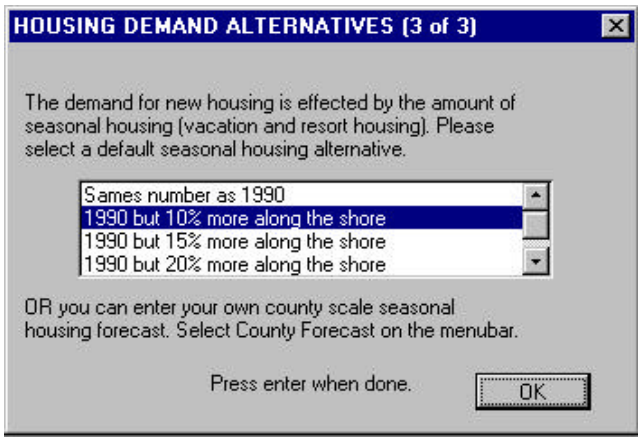


Headship represents the percentage of persons in a specific age/race/sex cohort who 'head' their own households[6]. Changes in the headship rate can be caused by a variety of factors such as a preference to marry later in life (more single persons heads of households in the young adult population), divorce, improvements in health care (resulting for example in more elderly living longer and able to maintain themselves), marriage preference changes (persons choosing to live together would represent a single household headed by one of the partners), and other social customs (such as choosing to live in single resident extended families). This is a very speculative variable, since it encompasses many social customs that have experienced substantial change in the past forty years. (The Trend has been for increasing higher headship rates for many cohorts, resulting in lower average household sizes.) It also is a very important variable, since it very much influences the program's forecast of housing need. Each of the headship alternatives included in the model has a very specific impact. You should try the each of these alternatives to learn which one appears to be most appropriate to your county.



As part of the model's process of estimating housing need (and ultimately in assigning population), the program 'ages' the existing (1990) housing and produces a forecast of the number of units that would remain in the forecast year. To produce this forecast, the model subtracts demolitions from the 1990 housing base and then adds units newly converted from non-residential structures. The model also adds vacant units to the total. The second Housing Demand Alternatives dialog box allows you to specify these variables. Please note that the choice to make 'further adjustments' is not currently active.

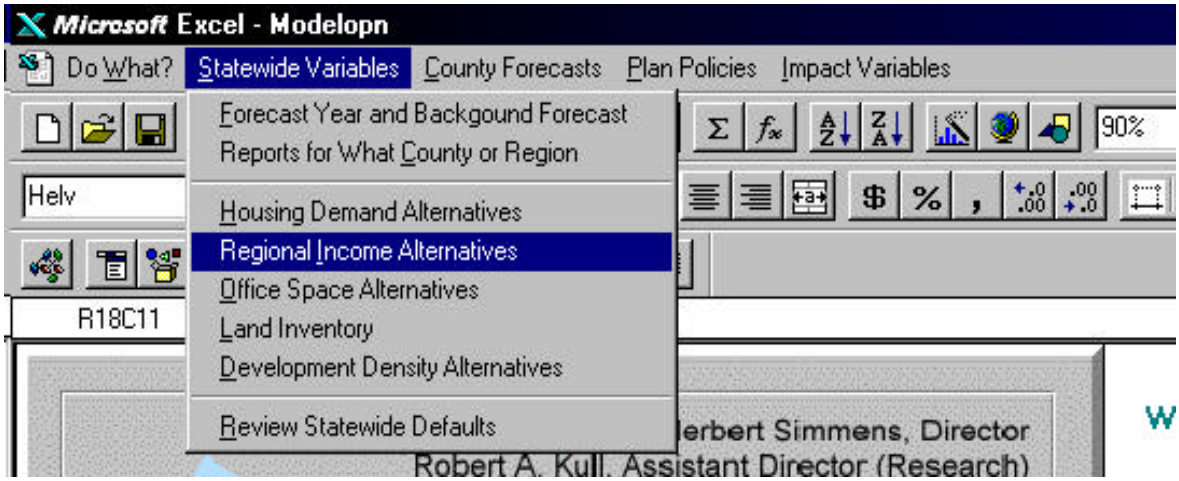
[6] See: Reilly, J. Distributing Population and Employment Forecasts to Municipalities. New Jersey Office of State Planning. 1990. pp. 9 - 10.



Another variable affecting the supply of housing structures available for use as year round dwelling units is the number of seasonal (resort) houses.

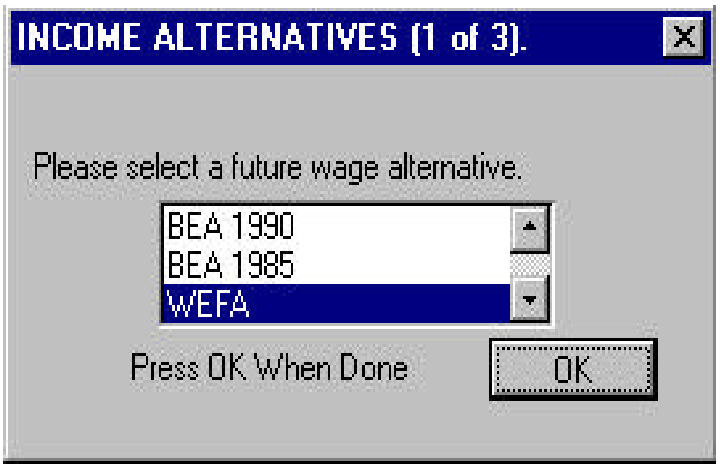
D. Regional Income Alternatives

The model estimates household income by separately estimating the individual components of income. (For the more technical, the income subroutine used by OSP is a form of OBERS model[7].) The variables selected under this command, and the employment forecast, are used in the income calculation process.

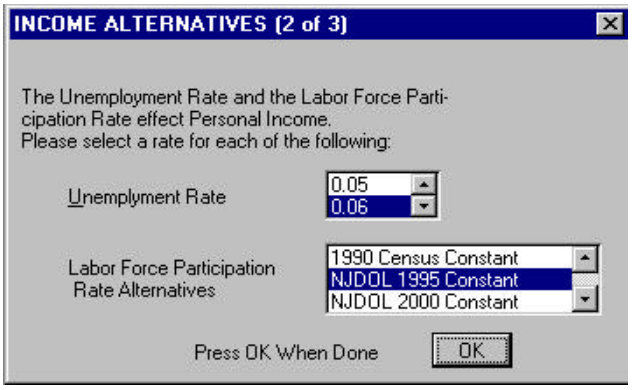


Three dialog boxes are presented.

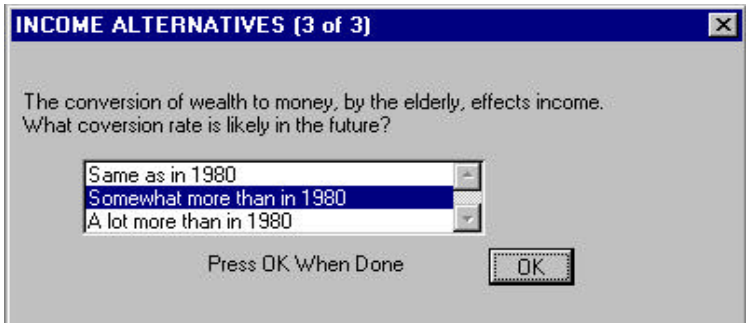
[7] See: Reilly, J. Description of the OSP Income Models. New Jersey Office of State Planning. Trenton, NJ (1992).



This dialog box presents published forecasts of (1990 constant dollar) wages that would be paid (for different types of employment) in the forecast year.



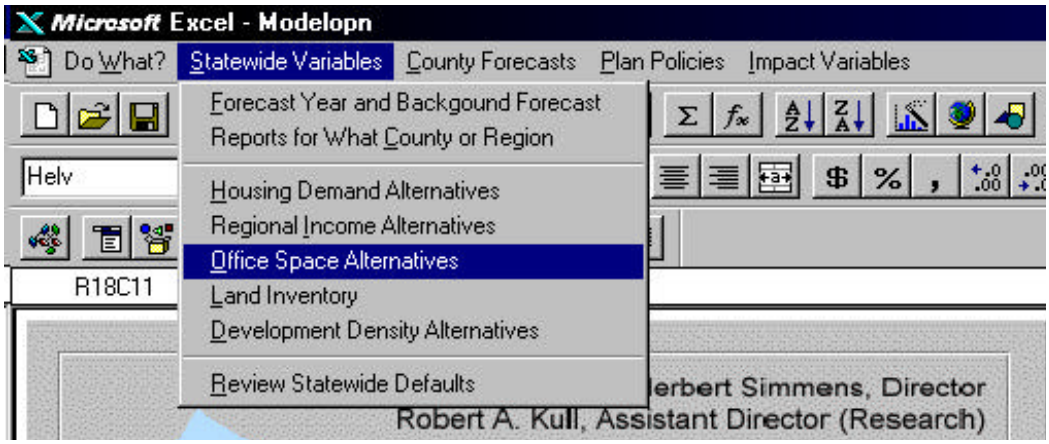
The unemployment rate and the labor force participation rate affect both income that is earned and other forms of income, such as unemployment compensation.



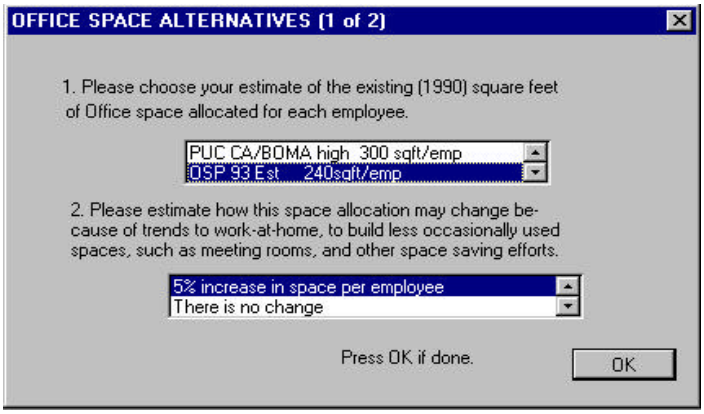
This dialog provides information about how older (retired) citizens might convert investments into annual income.

E. Office Space Alternatives

Part of the program that assigns jobs to municipalities assigns some of the forecasted office building based employment into existing (1990) office buildings that remain in the forecast year.

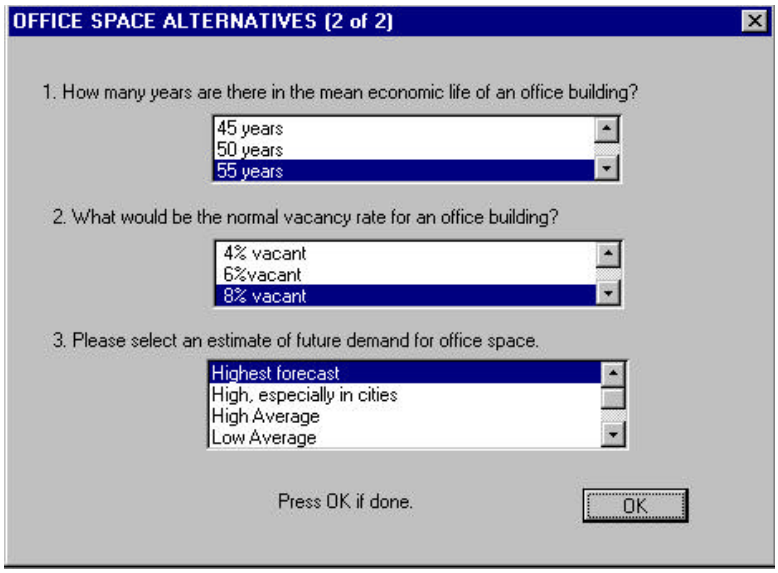


Only when a user selected occupancy threshold is achieved for these residual buildings, does the model begin to consume land for new office buildings. The variables selected under this command affect the model's calculation of office need and the assignment of office based jobs to municipalities[8].



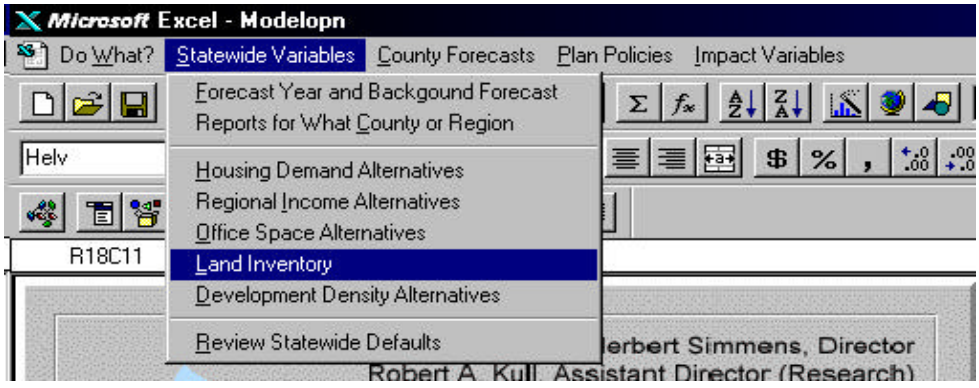
As you will see from the second variable in this dialog box, there is quite a lot of disagreement about the amount of office space built for the 'average' office worker. The second list asks you to speculate how your selected (1990) estimate of office space per employee might change by the forecast year. The current trend is for less space per employee.

[8] See: Reilly, J. Modifications to the PED Model: Improved Housing and Population Forecasts/ The Office Space Model. New Jersey Office of State Planning. Trenton, NJ (1994).



The first question asks you to select an average lifespan for office buildings. The second question really is asking what percent of office space must be filled before new structures are added to the inventory. For example, the selected value forecasts that when 92% of the office space in a municipality is filled, then new office building construction will take place in that municipality. The third variable asks the user to select from several rather technical statistical models that can be used to estimate the forecast year demand for office space. (The *Highest forecast* and the *High, especially in cities* options may be more realistic than the other options.)

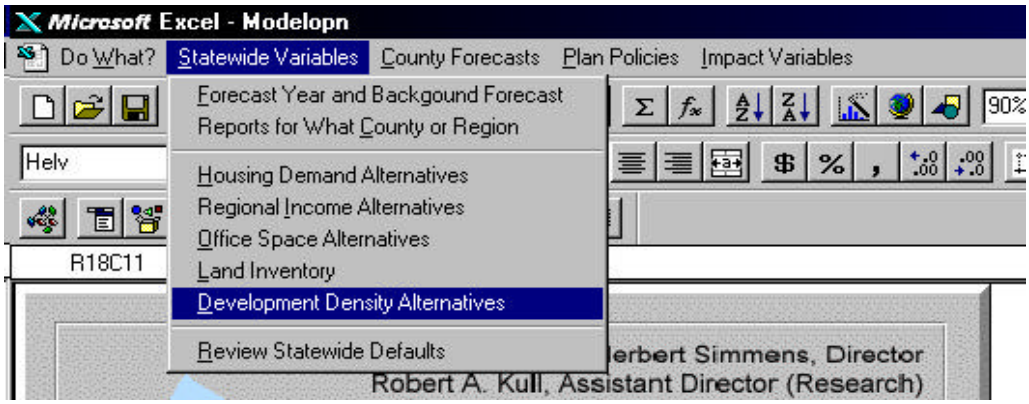
F. Land Inventory



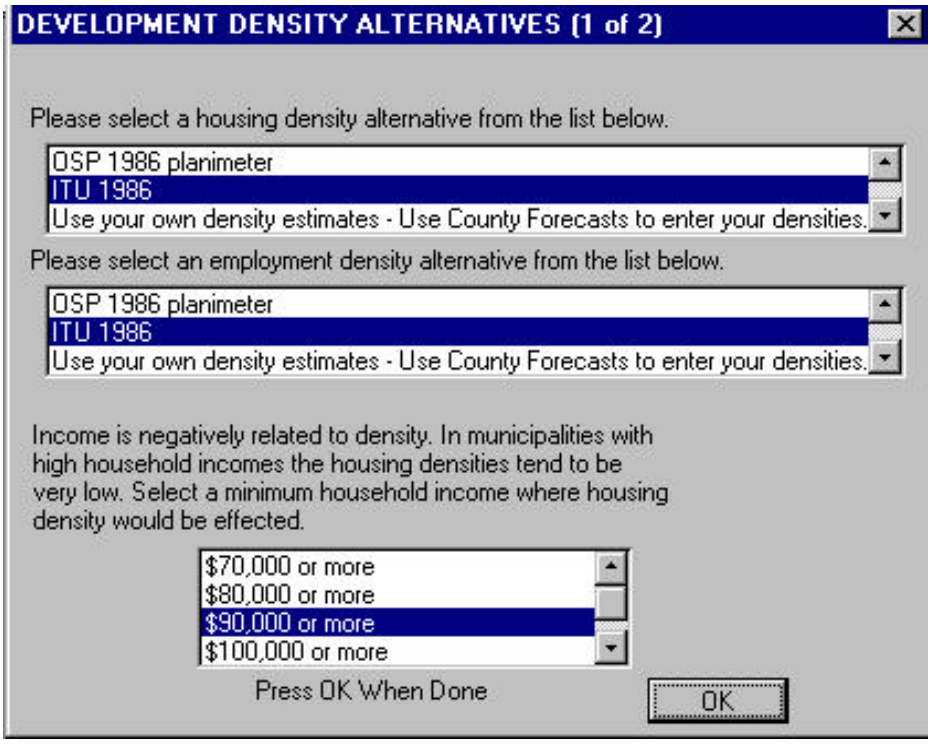
A basic feature of the OSP Growth Simulation Model is that it tests the capacity of municipalities to absorb preliminary growth assignments. To perform this activity, the program uses information about land available for development that has been produced from aerial photographs. You get to choose which inventory you prefer to use.

The most recent and comprehensive land inventory is the 1986 GIS-based land use/land cover inventory prepared by ESRI under contract to the New Jersey Department of Environmental Protection (NJDEP) as part of an Integrated Terrain Unit (ITU) mapping project. (You can modify various aspects in this inventory by using another menu item.)

G. Development Density Alternatives

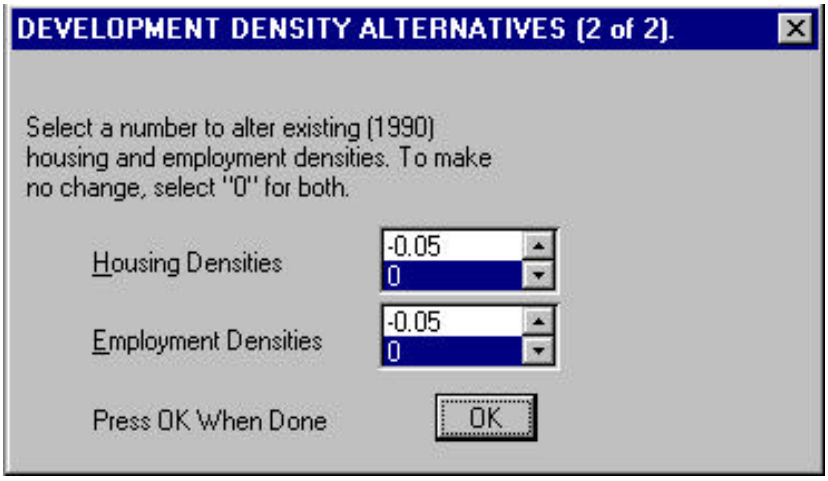


This options presented under this command determine densities that the program will use to assign growth to each municipality. (Under the County Forecasts menu item you will be able to review the densities derived by NJOSP from the 1986 NJDEP (ITU 1986) mapping and insert your own municipal specific estimates.)



The first two lists ask you to select from lists of both housing and job densities. Some of these lists are municipal specific while others are more generalized. The *ITU 1986* densities are currently the best available density information.

The last variable recognizes that municipalities with higher mean incomes tend not to be developed at high density. The dialog box asks you to decide the income threshold where higher density is unlikely.

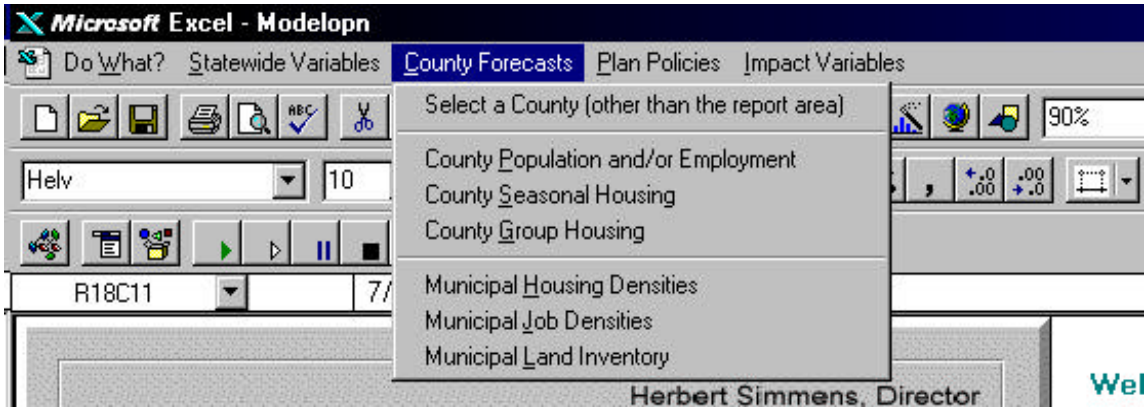


These dialog choices allow you to increase or decrease the historic housing and job densities so that they more accurately reflect densities at the forecast year. Negative

values represent less density in the forecast year, while positive values would result in higher development densities than those estimated for the base year.

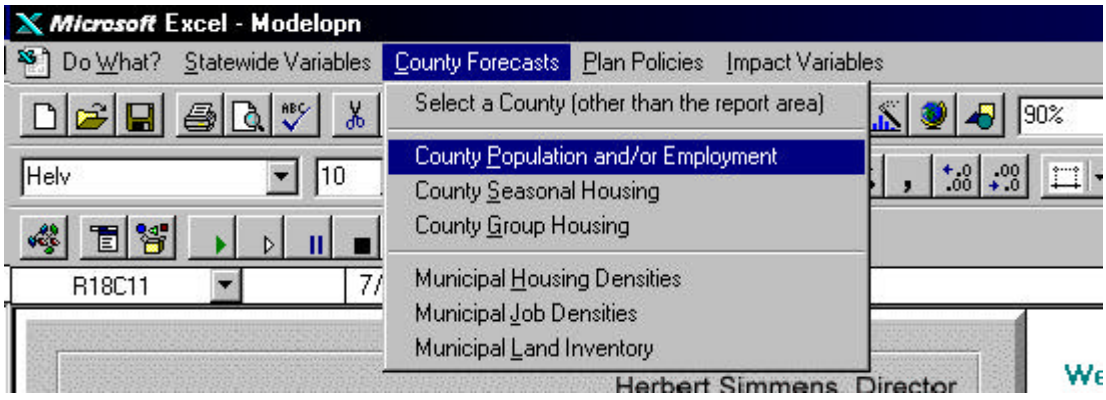
Entering County Forecasts

Several important municipal attributes and county specific forecasts were selected under the Statewide Variables menu Item. The purpose of the County Forecasts menu item is to allow you to review and modify detailed information about housing types, densities and land availability as well as to provide you with the opportunity to enter your own forecasts about county growth.

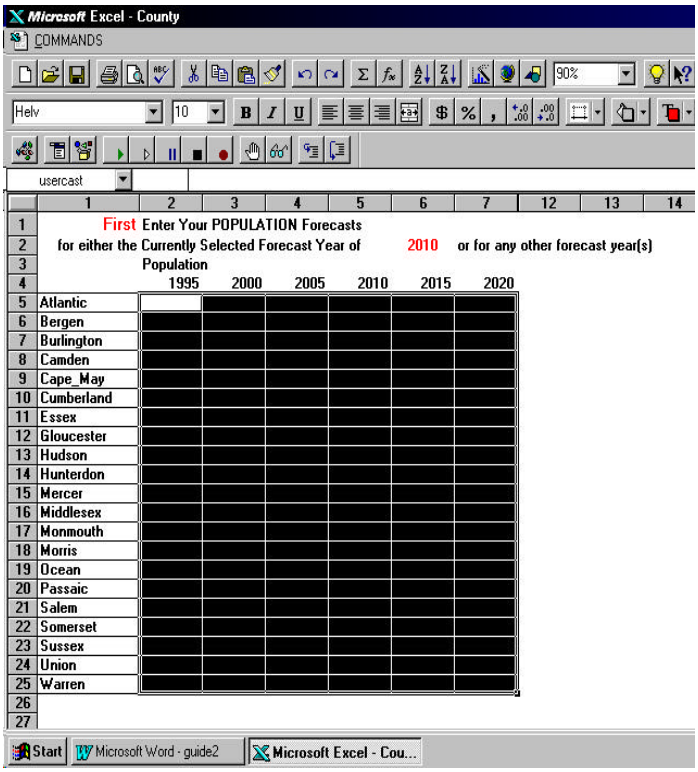


You should review information on a county by county basis. If you have set the reporting region to a regional reference (for example to report information about the NJTPA 13 county region), it is STRONGLY recommended that you use the first command, *Select a County (other than the report area)*, to allow you to review the density and land inventory information one county at a time. Choosing to review the information in this manner DOES NOT reset the reporting region used by the program.

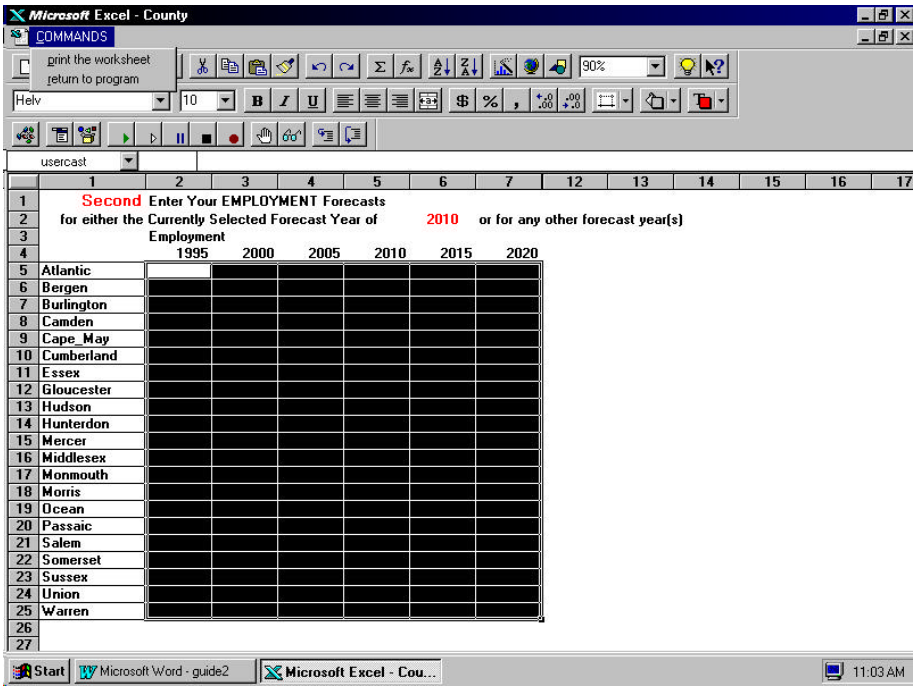
A. County Population and/or Employment



Selecting this command will cause the program to produce two input worksheets; one for population and the other for employment. Estimates you enter into these worksheets WILL BE USED by the program, for the county or counties that you have entered information. The background population and employment forecast will be used only for counties or forecast years for which you have not entered a new estimate.



Enter your population forecast into the appropriate county/year cell. You can choose to print a copy of the revised worksheet by clicking the menu item *Command* and scrolling to the command *Print the worksheet*. When you are done making all revisions, click on the menu item *Commands* and select *return to program*. This action causes the program to record your forecasts and brings up the employment worksheet.



The employment worksheet works just like the population worksheet. To return to the program after making all of your employment forecast revisions, you have to select the command *return to program*.

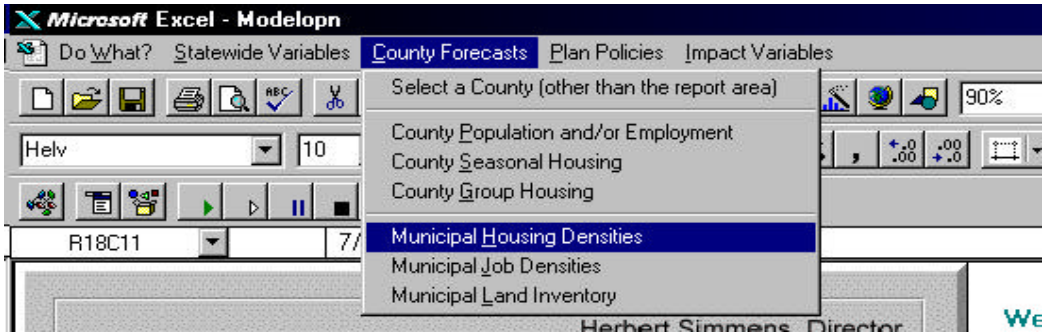
B. County Seasonal Housing

Choosing this command produces a worksheet similar to the population and employment worksheets. You enter your forecasts into the appropriate cell(s).

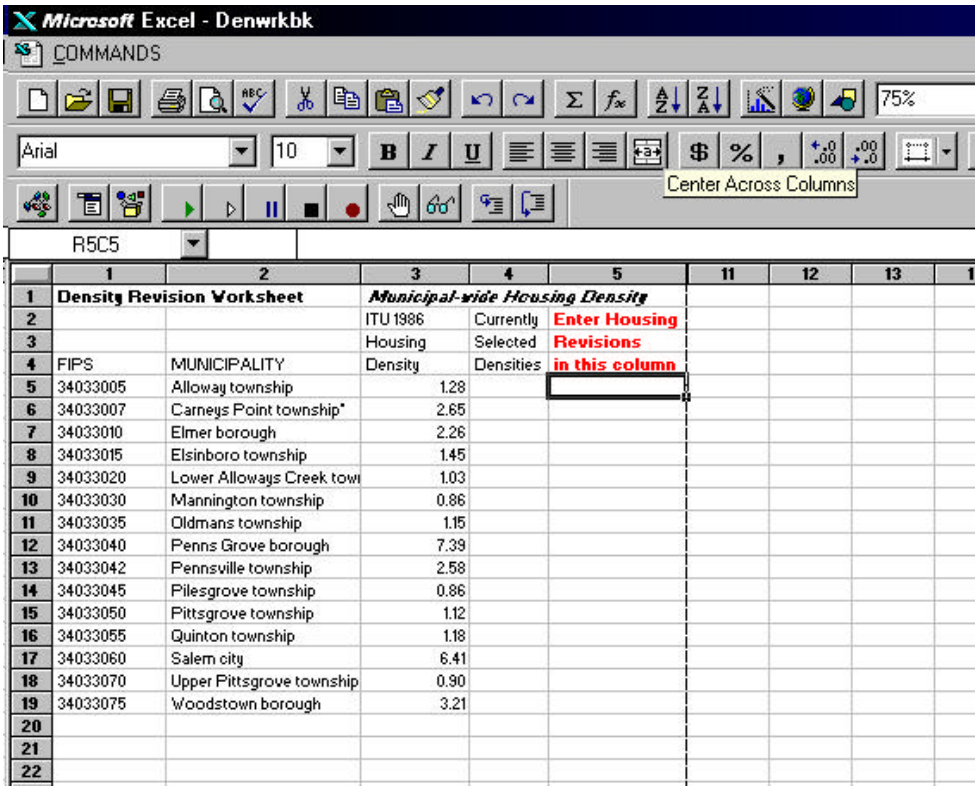
C. County Group Housing

This command produces a worksheet for the user to enter their forecast of group housing.

D. Municipal Housing Density



Selecting this command allows you to review the *ITU 1986* derived housing density values for each of the municipalities in your selected (report or other) county. You can also enter your own forecast of housing density. The program always uses your estimates in preference to any statewide default value.



	1	2	3	4	5
1	**Density Revision Worksheet**		***Municipal-wide Housing Density***		
2			ITU 1986	Currently	**Enter Housing**
3			Housing	Selected	**Revisions**
4	FIPS	MUNICIPALITY	Density	Densities	**in this column**
5	34033005	Alloway township	1.28		
6	34033007	Carneys Point township*	2.65		
7	34033010	Elmer borough	2.26		
8	34033015	Elsinboro township	1.45		
9	34033020	Lower Alloways Creek tow	1.03		
10	34033030	Mannington township	0.86		
11	34033035	Oldmans township	1.15		
12	34033040	Penns Grove borough	7.39		
13	34033042	Pennsville township	2.58		
14	34033045	Pilesgrove township	0.86		
15	34033050	Pittsgrove township	1.12		
16	34033055	Quinton township	1.18		
17	34033060	Salem city	6.41		
18	34033070	Upper Pittsgrove township	0.90		
19	34033075	Woodstown borough	3.21		
20					
21					
22					

The input worksheet shown in the example is for Salem County, since this is the report area specified (in this user guide). Both the FIPS codes and the municipal name are provided as references. Also shown is the housing density derived from the 1986 ITU GIS coverage. For example, you can see that the housing density (total 1990 year round dwelling units ÷ Total acres of residential land in 1986) for Alloway Township is 1.28

dwelling units per acre. If new density estimates have been made the revised densities (all changes plus any unchanged ITU densities) would appear in the column labeled "Currently Selected Densities". Since this column is blank, you can assume that no new estimates have been entered.

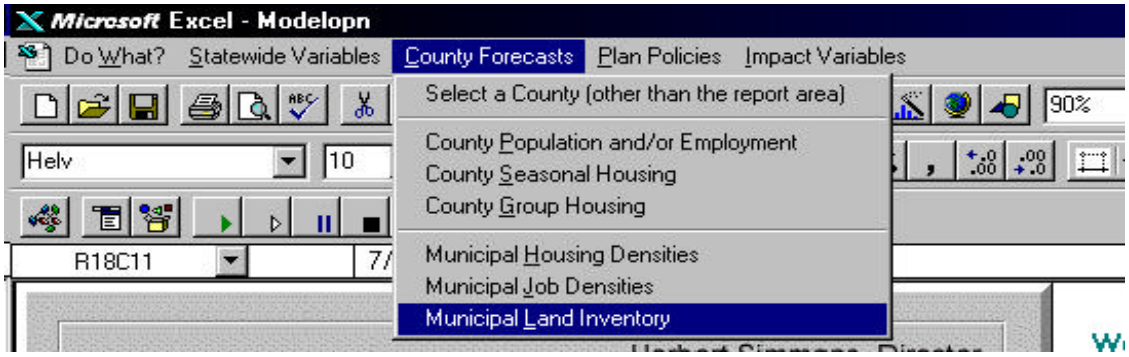
If you wish to change a density, you enter your new estimate in the column labeled "Enter Housing Revisions in this column". For example, you might decide that most new Alloway Township development between 1990 and the forecast year, might be located on large lots. Given this assumption, your forecast of future density would be ***lower*** than the ITU density. Perhaps you feel that a great deal of development will occur in a municipality which is largely developed. In that case you might want to use a forecast density ***higher*** than the ITU.

You need enter only the municipal densities you wish to change. All other municipal densities are a result of your selection under the menu item *Statewide Variables* and the command *Development Density Alternatives*. (Please remember that if you choose to increase or decrease the densities, your new estimates also will be affected by this decision.) When you have finished with the worksheet you can print it before you return to the main program.

E. Municipal Job Densities

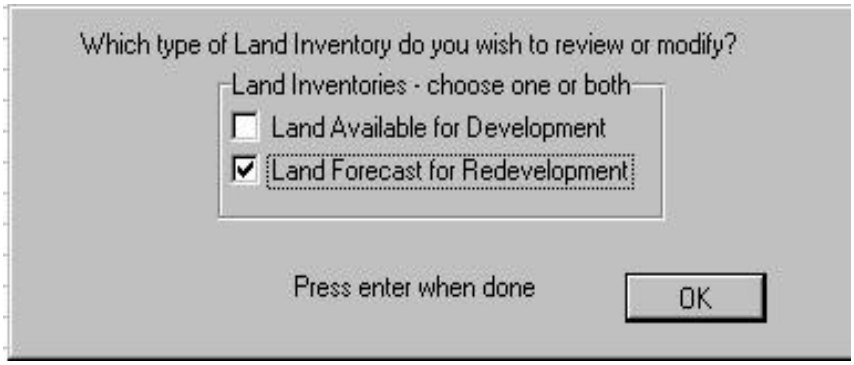
Selecting this command produces an input worksheet very similar to the housing density worksheet. Density is expressed in Jobs per 1986 acre of developed industrial, commercial land.

F. Municipal Land Inventory



Selecting this command allows you to modify the amount of land preserved from development in the forecast year (this land is subtracted from the inventory of available developable land) and to forecast additional land made available for development through redevelopment efforts. The estimate of available developable land used in the model was prepared by NJOSP. This estimate may approximate, but not necessarily represent, the estimate of "available developable land" used by the New Jersey Council

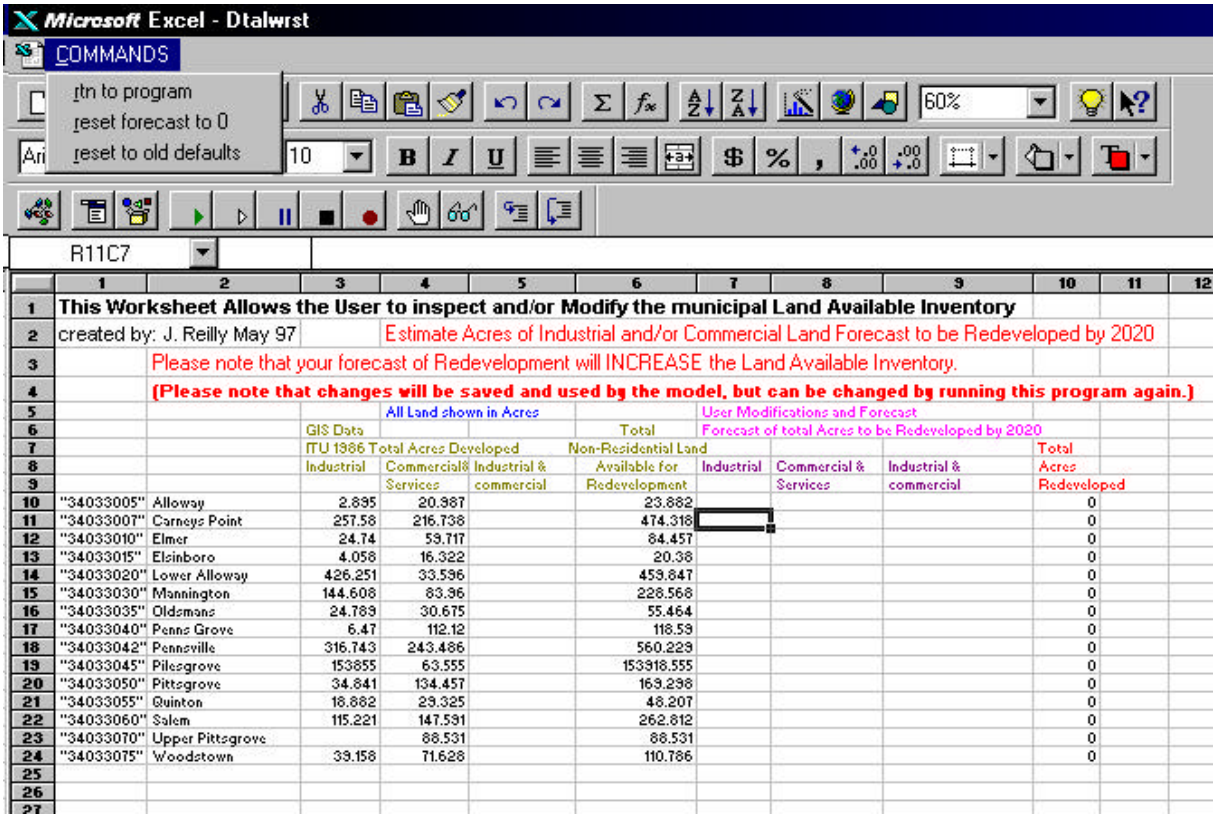
on Affordable Housing (COAH). Using the adjustments provided by the model, you may adjust the model's available land inventory to more closely approximate the COAH estimate.



You can choose to *decrease* the municipal supply of available developable land by forecasting increases in parks and other open space, Public Utility or Other Public Ownership, and the acres of farmland preserved by the State Agricultural Development Committee's Farmland Preservation program. To select this option, click on the box that appears before the words "Land Available for Development". You will be presented with more check box dialog windows to allow you to specify one or more of these land inventories. The program will then produce input worksheets that show the existing land supply (1986 ITU) and columns for you to enter your forecast. (This procedure is not illustrated in this guide.)

In the example shown, the choice has been made to forecast the amount of redevelopment that will occur by the forecast year. Making this choice causes the program to display the following dialog box. You can select to review or forecast either or both residential land and job related land.

The program first produces an input worksheet displaying information about job related land in each of Salem County's municipalities. All categories of job related developed land derived from the 1986 ITU are displayed as is the total of job related land for each municipality. For example, we can see that Alloway has almost 24 acres of job related land, of which almost three acres was identified as industrial and the rest was identified as commercial.

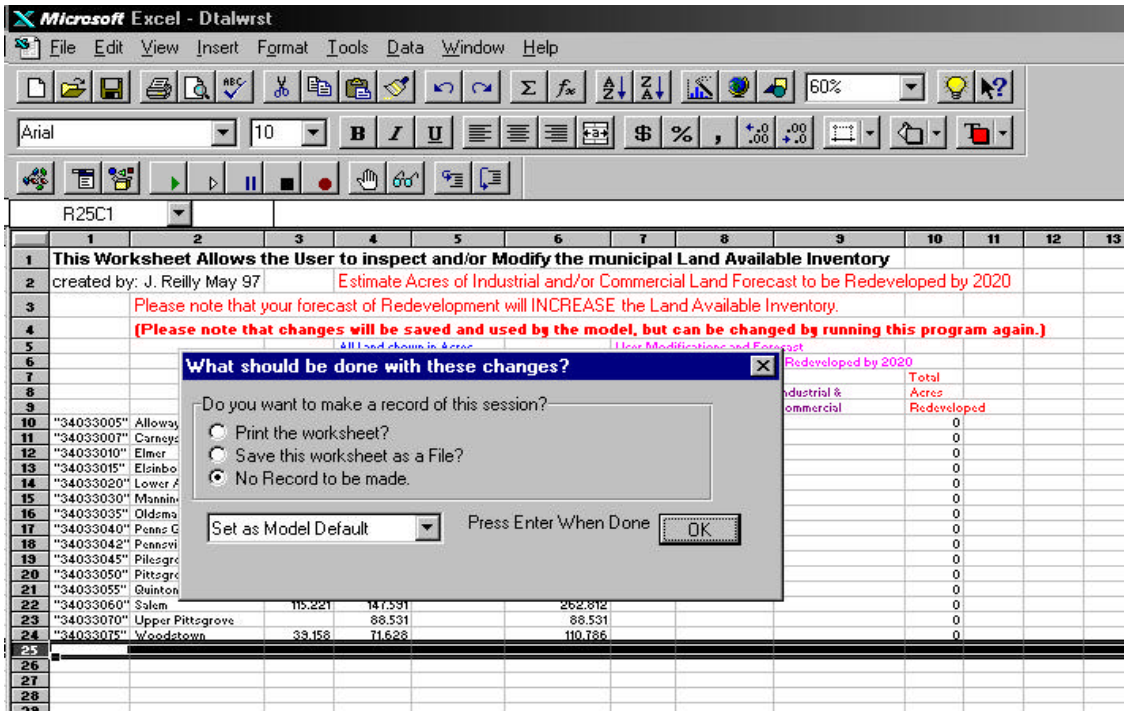


1	This Worksheet Allows the User to inspect and/or Modify the municipal Land Available Inventory											
2	created by: J. Reilly May 97			Estimate Acres of Industrial and/or Commercial Land Forecast to be Redeveloped by 2020								
3		Please note that your forecast of Redevelopment will INCREASE the Land Available Inventory.										
4		(Please note that changes will be saved and used by the model, but can be changed by running this program again.)										
5				All Land shown in Acres			User Modifications and Forecast					
6			GIS Data			Total	Forecast of total Acres to be Redeveloped by 2020					
7			ITU 1986 Total Acres Developed			Non-Residential Land				Total		
8			Industrial	Commercial& Services	Industrial & commercial	Available for Redevelopment	Industrial	Commercial & Services	Industrial & commercial	Acres Redeveloped		
10	"34033005"	Alloway	2.895	20.987		23.882				0		
11	"34033007"	Carneys Point	257.58	216.738		474.318				0		
12	"34033010"	Elmer	24.74	59.717		84.457				0		
13	"34033015"	Elsinboro	4.058	16.322		20.38				0		
14	"34033020"	Lower Alloway	426.251	33.596		459.847				0		
15	"34033030"	Mannington	144.608	83.96		228.568				0		
16	"34033035"	Oldsmans	24.789	30.675		55.464				0		
17	"34033040"	Penns Grove	6.47	112.12		118.59				0		
18	"34033042"	Pennsville	316.743	243.486		560.229				0		
19	"34033045"	Pilesgrove	153855	63.555		153918.555				0		
20	"34033050"	Pittsgrove	34.841	134.457		169.298				0		
21	"34033055"	Quinton	18.882	29.325		48.207				0		
22	"34033060"	Salem	115.221	147.591		262.812				0		
23	"34033070"	Upper Pittsgrove		88.531		88.531				0		
24	"34033075"	Woodstown	39.158	71.628		110.786				0		

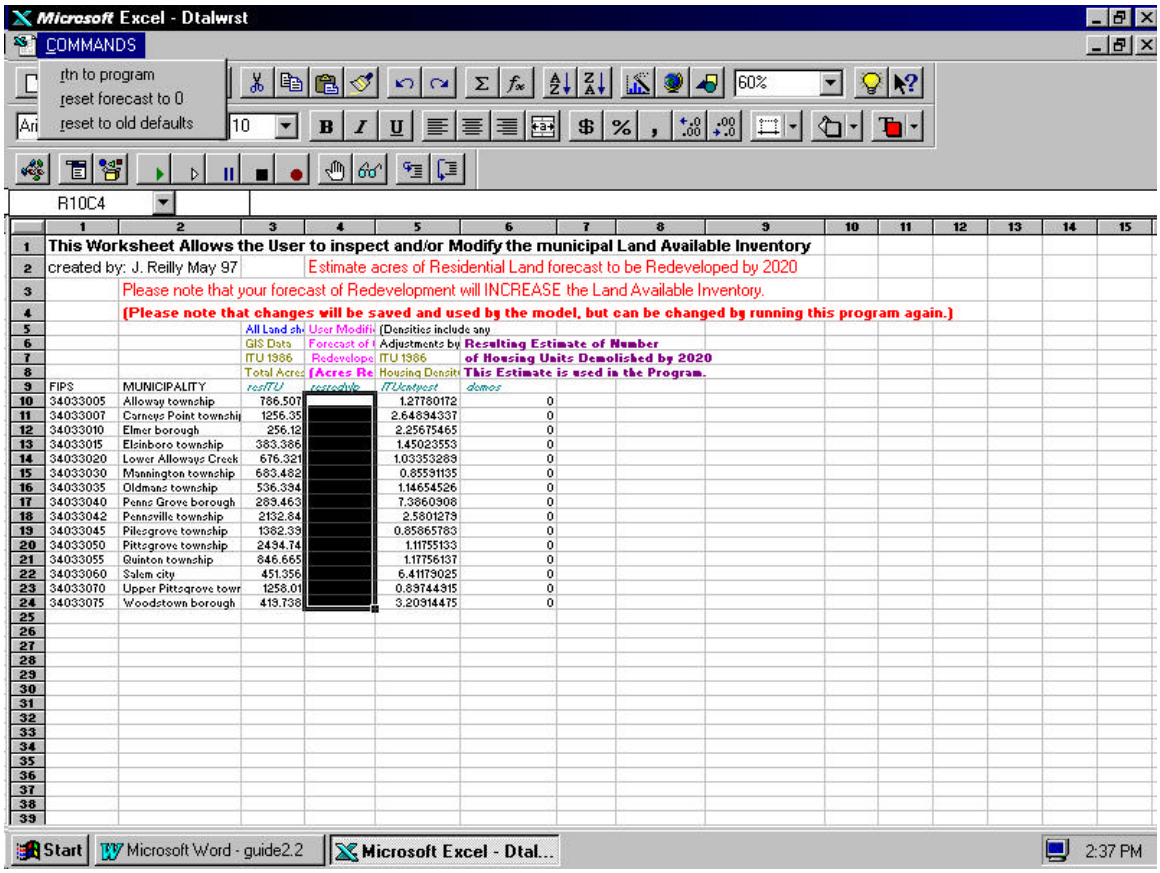
As with all other input worksheets, you simply enter your forecast for those municipalities that you wish to change into the columns identified for your input. (These should be the only cells that you can use to enter data - try entering data into another location!) You have three commands. You can reset all values to zero. You can reset the values to your pre-selected (if you made any) values. Finally, having become satisfied (or frustrated) you can return to the program.

When you choose to return, the program will run an error check on your forecast to insure that you did not ‘redevelop’ more land than existed in 1986. If you made a mistake, the program will erase your erroneous forecast and prompt you to enter a new forecast.

When the error check runs cleanly, you will be presented with the following choices. You can print the worksheet or save it to file, or elect not to save it at all. You also can choose to make these (and all) land inventory changes permanent program defaults or you can choose to run the model once using these values (if this is your intention DO NOT turn the program off before making the run - since doing so will cause these temporary choices to be erased forever).



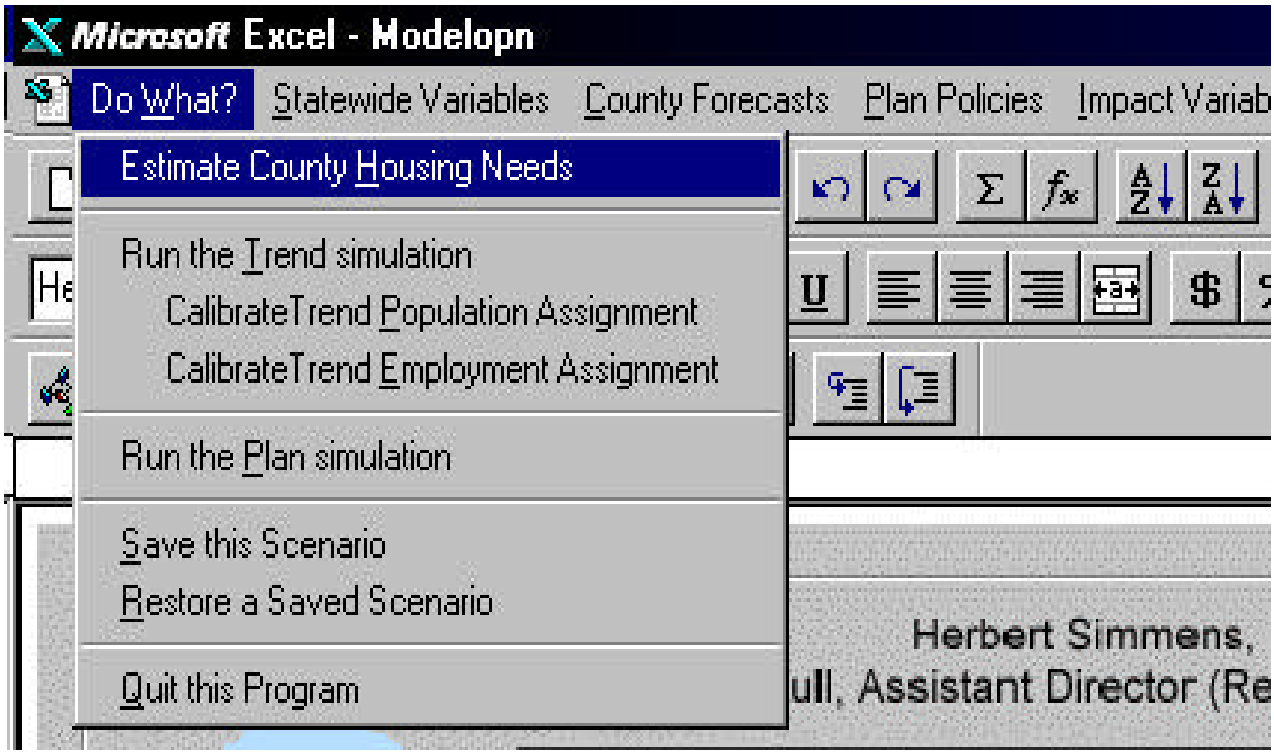
The program then produces the residential land input worksheet (you remember that we selected for this to happen). The 1986 ITU-derived acres of residential land is displayed and there is a column for you to enter your estimate of residential land that is to be redeveloped (made available for development) by the forecast year. When you enter a redevelopment forecast (acres), you will note that the worksheet produces an estimate of the number of (existing) dwelling units that your forecast would demolish. This estimate of demolition in used by the program instead of the Statewide Variable demolition forecast.



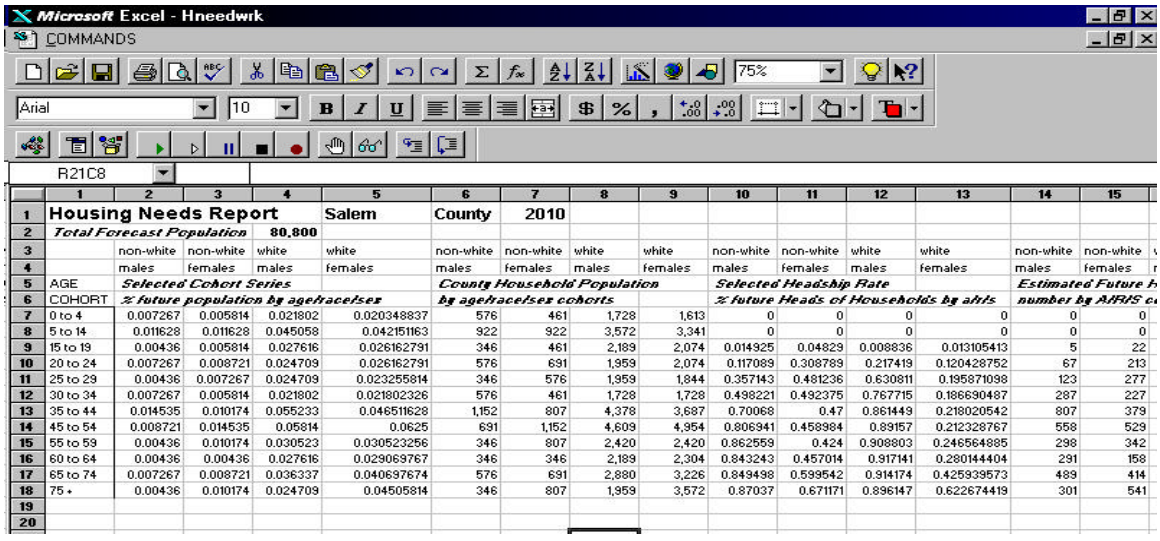
When you have finished making your estimates, click on the command to return to program.

Second - Produce an Estimate of County Housing Need

Once you have set the Statewide Variables and County Forecasts to your preferences, click on the Menu item *Do What?* and click on the command *Estimate County Housing Needs*.



The program will run and after a few minutes produce a report, like the one shown below. You can scroll around the screen and look at this report (but you cannot change it or enter data onto it). If you have chosen a multi-county reporting area, the program produces reports (sequentially) for each of the counties in your selected region. You have two commands available under the menu item *Commands*. You can print the report and you can *return to the program*. Selecting to *return to the program* quits this subroutine, destroys the report and returns you to the main menu).



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	**Housing Needs Report**				**Salem**	**County**	**2010**								
2	***Total Forecast Population***			**80,800**											
3		non-white	non-white	white	white	non-white	non-white	white	white	non-white	non-white	white	white	non-white	non-white
4		males	females	males	females	males	females	males	females	males	females	males	females	males	females
5	AGE	***Selected Cohort Series***				***County Household Population***				***Selected Headship Rate***				***Estimated Future H***	
6	COHORT	***% future population by age/race/sex***				***by age/race/sex cohorts***				***% future Heads of Households by a/r/s***				***number by ARRS c***	
7	0 to 4	0.007267	0.005814	0.021802	0.020348837	576	461	1,728	1,613	0	0	0	0	0	0
8	5 to 14	0.011628	0.011628	0.045058	0.042151163	922	922	3,572	3,341	0	0	0	0	0	0
9	15 to 19	0.00436	0.005814	0.027616	0.026162791	346	461	2,189	2,074	0.014925	0.04829	0.008836	0.013105413	5	22
10	20 to 24	0.007267	0.008721	0.024709	0.026162791	576	691	1,959	2,074	0.117089	0.308789	0.217419	0.120428752	67	213
11	25 to 29	0.00436	0.007267	0.024709	0.023255814	346	576	1,959	1,844	0.357143	0.481236	0.630811	0.195871098	123	277
12	30 to 34	0.007267	0.005814	0.021802	0.021802326	576	461	1,728	1,728	0.498221	0.492375	0.767715	0.186690487	287	227
13	35 to 44	0.014535	0.010174	0.055233	0.046511628	1,152	807	4,378	3,687	0.70068	0.47	0.861449	0.218020542	807	379
14	45 to 54	0.008721	0.014535	0.05814	0.0625	691	1,152	4,609	4,954	0.806941	0.458984	0.89157	0.212328767	558	529
15	55 to 59	0.00436	0.010174	0.030523	0.030523256	346	807	2,420	2,420	0.862559	0.424	0.908803	0.246564885	298	342
16	60 to 64	0.00436	0.00436	0.027616	0.029069767	346	346	2,189	2,304	0.843243	0.457014	0.917141	0.280144404	291	158
17	65 to 74	0.007267	0.008721	0.036337	0.040697674	576	691	2,880	3,226	0.849498	0.539542	0.914174	0.425939573	489	414
18	75 +	0.00436	0.010174	0.024709	0.04505814	346	807	1,959	3,572	0.87037	0.671171	0.896147	0.622674419	301	541
19															
20															

It is strongly suggested that you print the report and take a close look at it. Quite a lot of information is shown in this report. As you can see the report only contains information

about the selected report area (Salem County). It also shows the total population at the forecast year. Other information shown are demolitions, conversions, vacancy, group quarters, seasonal units, total needed housing units, total new units that have to be constructed (between 1990 and the forecast year) and county average household size.

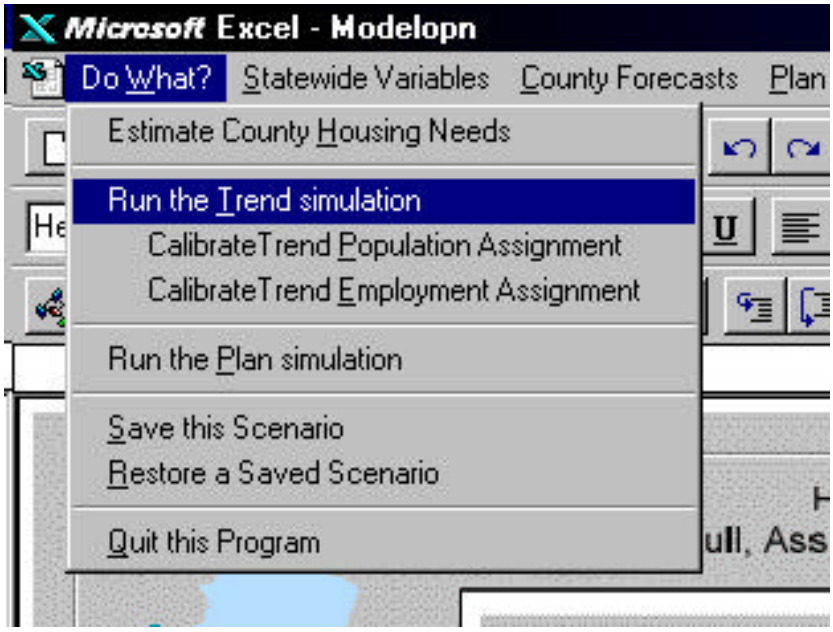
If one of these values seems inappropriate, select a new value using the commands listed under the menu items *Statewide Variables* and *County Forecasts*. In fact, given the ambiguity regarding the future, it is suggested that you try other variable combinations, since many of these variables are derived from 'authoritative' sources. You might be surprised at the enormous range in housing need, even assuming a constant population forecast.

Once you have produced one or more housing need forecasts that you feel are realistic you are ready to begin to run the Trend program.

Third - Run and Calibrate the Trend Simulation

Running the Trend Simulation

To run the Trend Simulation simply click on the menu item *Do What?* and scroll to the command *Run the Trend simulation*. (Before you run the Trend program click on the *Impact Variables* menu item and select the command *Run Which Impacts*. Make sure that all of the check boxes are empty, since we do not want to run any impact programs at this time.)



Selecting the *Run the Trend simulation* command begins a program. Depending on how fast your computer system is, this program can run in about 10 minutes or can take

several hours to run. When this program is running do not try to give any commands to Excel - this action will not harm the program or Excel, but it might cause the program to stop running before it is finished. If you are using Windows for Workgroups, Windows 3.something, or Windows 95, your best bet is to leave the computer alone until the program is done. If you are using Windows NT, you can launch another program and work away, provided you have sufficient RAM to support this action (32 MB minimum).

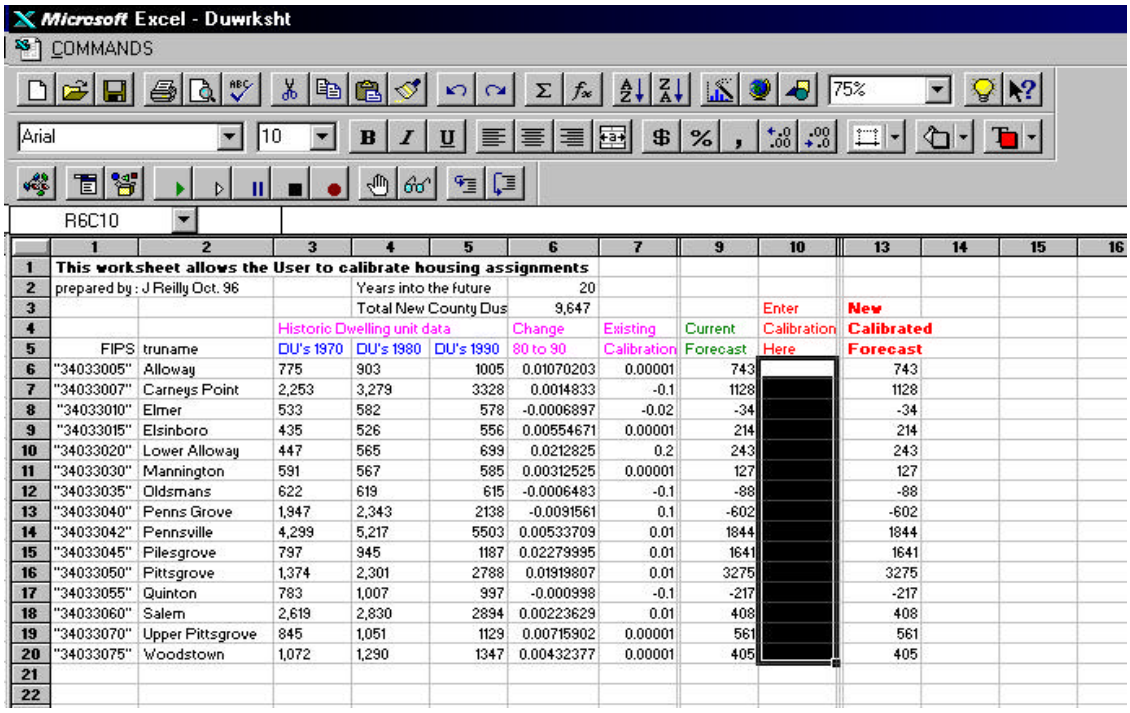
When the Trend program is done, you will be asked if you want to print the report, save it to disk or return to the program. You cannot choose to review the results on your computer screen. Print the report so that you can examine it.

Calibrating Trend so that it Produces a Reasonable Forecast

Quite a lot of information is presented in the Trend report. For the moment, ignore everything except the population forecasts for each municipality. Testing of the growth allocation model has indicated that most regional planners (and quite a few citizens) have very definite ideas about the future population of municipalities.

The growth allocation produced by the model is based on statistical relationships, a mathematical model and information about land availability. This is to say that the model produces an scientifically based, elaborate guess - perhaps a good guess and perhaps not so good a guess depending on which municipality is examined. The reason the model is not better at guessing is that it does not know a lot of the information that you might know. For example, the model does not know of any development since 1990. Nor does it know of developer interest. Nor does it know of the development philosophy of respective planning commission members or land holders in each community. It knows nothing about municipal zoning. The Trend Calibration programs allow you to flavor the model's municipal growth forecasts to reflect this (and other) vital information.

Once you have reviewed the initial set of municipal population forecasts, try to identify one or two municipalities where the largest corrections are needed. (DO NOT try to calibrate all the municipalities at the same time.) Now run the population calibration program by clicking on the menu item *Do What?* and the command *Calibrate Trend Population Assignment*. Performing this action starts a program which creates the following input worksheet after a few minutes.



Microsoft Excel - Duwrksht

COMMANDS

R6C10

	1	2	3	4	5	6	7	9	10	13	14	15	16
1	This worksheet allows the User to calibrate housing assignments												
2	prepared by : J Reilly Oct. 96			Years into the future		20							
3				Total New County Dus		9,647			Enter	New			
4			Historic Dwelling unit data			Change	Existing	Current	Calibration	Calibrated			
5	FIPS	truname	DU's 1970	DU's 1980	DU's 1990	80 to 90	Calibration	Forecast	Here	Forecast			
6	"34033005"	Alloway	775	903	1005	0.01070203	0.00001	743		743			
7	"34033007"	Carneys Point	2,253	3,279	3328	0.0014833	-0.1	1128		1128			
8	"34033010"	Elmer	533	582	578	-0.0006897	-0.02	-34		-34			
9	"34033015"	Elsinboro	435	526	556	0.00554671	0.00001	214		214			
10	"34033020"	Lower Alloway	447	565	699	0.0212825	0.2	243		243			
11	"34033030"	Mannington	591	567	585	0.00312525	0.00001	127		127			
12	"34033035"	Oldsmans	622	619	615	-0.0006483	-0.1	-88		-88			
13	"34033040"	Penns Grove	1,947	2,343	2138	-0.0091561	0.1	-602		-602			
14	"34033042"	Pennsville	4,299	5,217	5503	0.00533709	0.01	1844		1844			
15	"34033045"	Pilesgrove	797	945	1187	0.02279995	0.01	1641		1641			
16	"34033050"	Pittsgrove	1,374	2,301	2788	0.01919807	0.01	3275		3275			
17	"34033055"	Quinton	783	1,007	997	-0.000998	-0.1	-217		-217			
18	"34033060"	Salem	2,619	2,830	2894	0.00223629	0.01	408		408			
19	"34033070"	Upper Pittsgrove	845	1,051	1129	0.00715902	0.00001	561		561			
20	"34033075"	Woodstown	1,072	1,290	1347	0.00432377	0.00001	405		405			
21													
22													

The population calibration program uses houses as a surrogate for people because this number is quicker to generate and more consistent with the format of the program. The worksheet provides Census historic data as reference. It also shows the existing calibration values used by the program, if any have been specified. (Since this column is filled with numbers, you can assume that some calibration has occurred.) The current forecast shows the net number of NEW HOUSING UNITS that are to be built (or lost) in each municipality between 1990 and the forecast year.

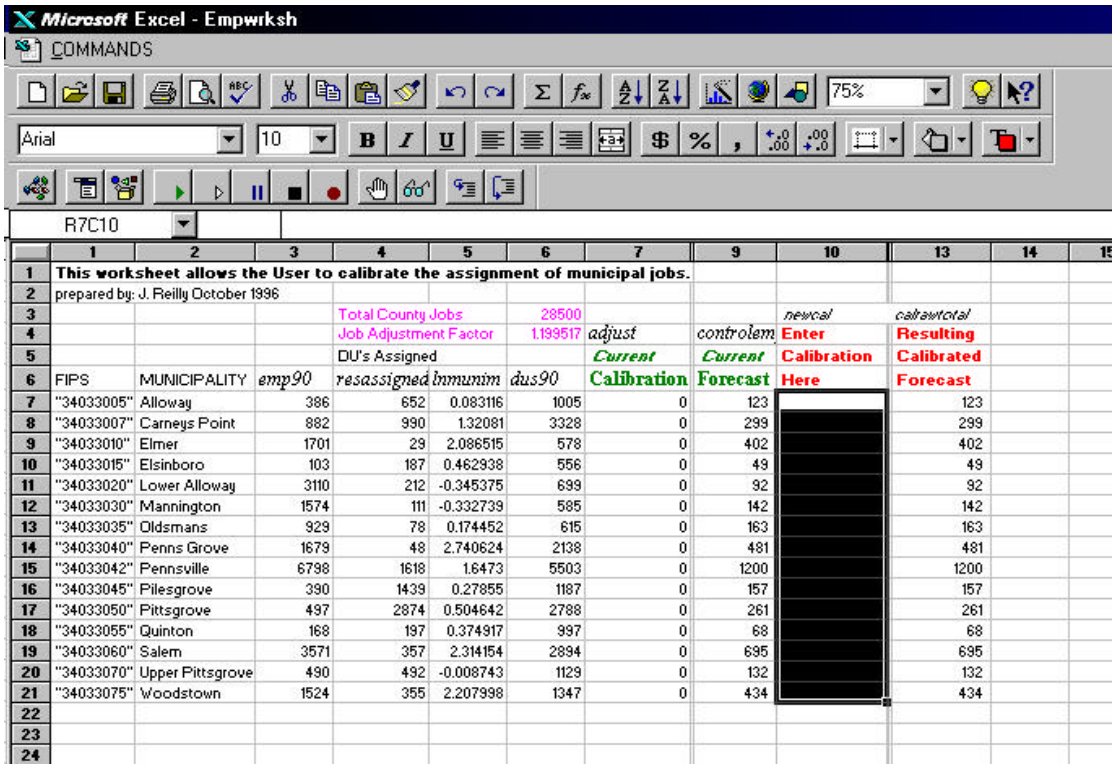
To calibrate a municipality, simply enter a new calibration value in the appropriate column. Remember, the calibration process is not simple arithmetic (e.g. do not enter a calibration of 5 if you want to increase the number by five dwelling units. Try doing this just for fun - it will not harm the program.) Enter very small calibration value, such as .002, and watch the worksheet make changes once you press the enter key (just as you would have to in Excel to tell the program that you want this number accepted.). You will note that both the municipal estimate of housing changes AND some, if not all, of the other municipal total also change. (Since the county total population did not change and you increased the assignment to one municipality, that increase had to come from one or more of the other municipalities in the county. This is why you should not try to calibrate every municipality in one round.)

Having calibrated those municipalities with the most need for change, you can print the worksheet (if you choose) and return to the program. When you return, you will be reminded that you need to re-run Trend and look at the actual population assignment changes to determine the success of the calibration.

Our experience is that most county and regional planners have an intuitive sense of how much growth is appropriate in each municipality, at the forecast year. To achieve this intuitive growth estimate will take several runs of the calibration and fitted Trend forecasts. The following is a list of suggestions to consider *before* you calibrate:

1. If you have chosen a headship rate which reduces average household size (in the County Housing Needs report), then it is very likely that most fully developed municipalities will experience population *declines*, even though the number of dwelling unit may remain constant or even slightly increase.
2. Unless there is some very unusual local condition or policy, employment is assigned to municipalities that have experienced population growth. Also, population loss is usually associated with employment decline. (Remember, you calibrate employment separately.)
3. Do not be afraid to try alternative county forecasts or alternative headship rates. You might discover that when these forecasts are distributed to municipalities, you feel the municipal forecasts are more comfortable.
4. Check the available land inventory. You might discover that it claims that no land is available to accommodate new growth. You might want to check this out, before arbitrarily changing the inventory.
5. When calibrating, do not try to calibrate all of the municipalities at the same time. Calibrate those which you feel need the largest changes. Run Trend and look at the results. If more calibration is needed, again focus on those municipalities that need the largest changes.
6. Remember, you are calibrating dwelling units to attempt to change population assignments. Make relative changes. While this may be awkward, it is the best method currently available to do the calibration for population. (Employment calibration is more straightforward. You actually calibrate jobs - what you see is what you get.)
7. Finally, remember that the objective of calibration is to develop a ‘fitted’ Trend forecast that you feel is reasonable!

Only after you have completed your calibration of population should you begin to calibrate employment. To start the program you click on the menu item *Do What?* and scroll to the command *Calibrate Trend Employment Assignment*. This starts a small program which runs for a few minutes, finally producing another input worksheet like the following example for Salem County.



Microsoft Excel - Empwrksh

COMMANDS

R7C10

	1	2	3	4	5	6	7	9	10	13	14	15
1	This worksheet allows the User to calibrate the assignment of municipal jobs.											
2	prepared by: J. Reilly October 1996											
3				Total County Jobs		28500			newcal	calrawtotal		
4				Job Adjustment Factor		1.199517	adjust	controlem	Enter	Resulting		
5				DU's Assigned			Current	Current	Calibration	Calibrated		
6	FIPS	MUNICIPALITY	emp90	resassigned	lnmunim	dus90	Calibration	Forecast	Here	Forecast		
7	"34033005"	Alloway	386	652	0.083116	1005	0	123		123		
8	"34033007"	Carneys Point	882	990	1.32081	3328	0	299		299		
9	"34033010"	Elmer	1701	29	2.086515	578	0	402		402		
10	"34033015"	Elsinboro	103	187	0.462938	556	0	49		49		
11	"34033020"	Lower Alloway	3110	212	-0.345375	699	0	92		92		
12	"34033030"	Mannington	1574	111	-0.332739	585	0	142		142		
13	"34033035"	Oldsmans	929	78	0.174452	615	0	163		163		
14	"34033040"	Penns Grove	1679	48	2.740624	2138	0	481		481		
15	"34033042"	Pennsville	6798	1618	1.6473	5503	0	1200		1200		
16	"34033045"	Pilesgrove	390	1439	0.27855	1187	0	157		157		
17	"34033050"	Pittsgrove	497	2874	0.504642	2788	0	261		261		
18	"34033055"	Quinton	168	197	0.374917	997	0	68		68		
19	"34033060"	Salem	3571	357	2.314154	2894	0	695		695		
20	"34033070"	Upper Pittsgrove	490	492	-0.008743	1129	0	132		132		
21	"34033075"	Woodstown	1524	355	2.207998	1347	0	434		434		
22												
23												
24												

Again historic information, supplied by the New Jersey Department of Labor, is shown for reference. In this case, it can be seen that no previous calibration had been attempted. Unlike population, which uses the surrogate of dwelling units, this calibration worksheet shows jobs. Again, please enter very small calibration values starting with the one or two municipalities that appear to you to be most out of kilter. When you have performed this first cut calibration, return to the program and run Trend. Again, several iterations likely will be needed to produce a reasonable forecast.

Eventually Trend will be calibrated. This is an important event, since Plan only modifies Trend. If you do not believe the model's Trend forecast is reasonable, it will be impossible for you (or anyone else) to make sense of Plan simulation results.

Fourth - Preparing the Impact Models for Your Use

It is now time for you to prepare the impact model for use. Before selecting some or none of these program to work, you need to select variables that will affect some of these models. Once you have made your preliminary selection, then you need to run each of these models separately with your calibrated Trend so that you can closely examine the impact predictions produced by the model.

This impact review phase is just as important as Trend calibration. If you are not assured that the model's Trend impact projections are reasonable, then it is very unlikely that you will feel much confidence in Plan impact forecasts.

A few tips on using the Impact models.

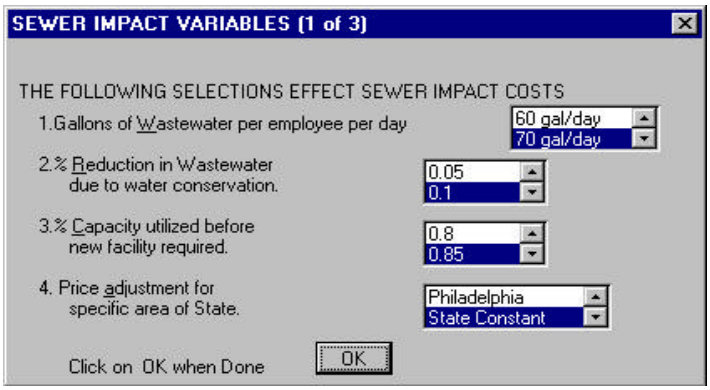
1. Unless your Trend simulation is calibrated, you should not run the impact portion of the model.
2. Do not try to develop a Trend forecast that has better or worse impacts than another "trend' forecast. You will drive yourself to distraction with this approach. (Besides aren't you really just generating a form of 'plan' scenarios with this approach?)
3. The purpose of the impact portion of the model is to provide the user with relative reasonable costs, which have been produced using thoughtful methods. These cost estimates are very unlikely to be exactly correct. However, we feel that they are appropriate for use in comparing Trend and Plan scenarios.
4. Take a very hard look at the resulting impact forecasts. If they appear to be unreasonable, there is some calibrating that you can do or you might try other variable values. If you still cannot get impact results that look reasonable, call NJOSP. For example, it is possible there are errors in the data sets used by the impact models. If you notice a very strange forecast, call NJOSP and let us know. We are willing to check for errors.
5. Finally, recognize that the Plan scenario you might like the best may not be the least expensive development plan. And always remember that this model only generates certain impacts - not all impacts.

Neither the government cost model nor the land consumption model require any user input. It is important to note that the government cost model's forecast is only the costs during the forecast year - it does not represent cumulative costs from the base year to the forecast year.

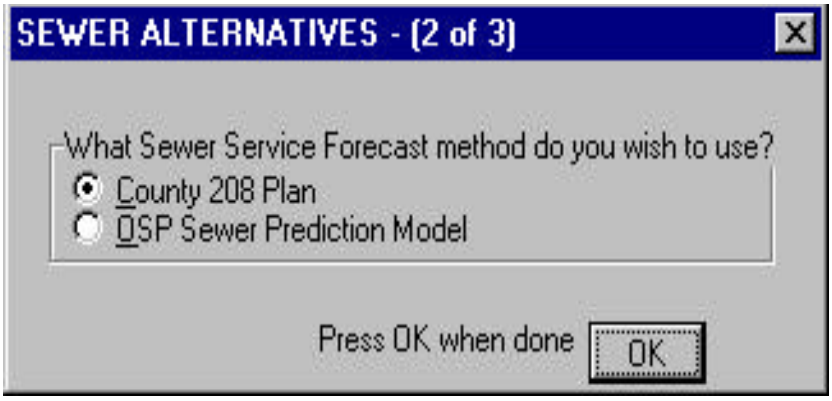
Selecting Impact Variables

A. Sewer Variables

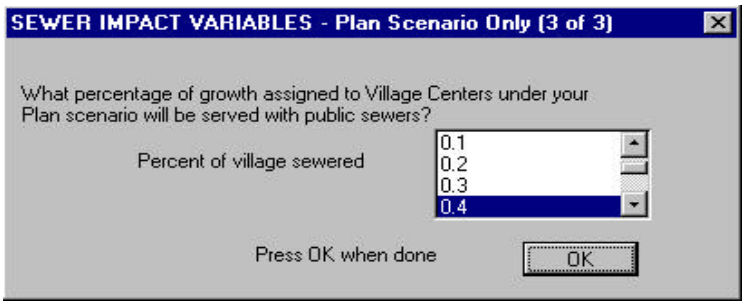
Begin by selecting the variables needed to generate sewer costs. To start this subroutine click on the menu item *Impact Variables* and scroll to the command *Sewer Variables*. These actions start a program which generate the following dialog boxes.



The first sewer program dialog box screen is illustrated above. The user makes his selection in the same manner as all other input screens used in this program. You will note that the model does not ask you to estimate residential water consumption. This is because the model contains a data file with this information for each of the public water supply companies in the State. (In a latter version of this model you will be allowed to review and modify this data set.) However, you can (somewhat) modify these historic values by your selection to question 3.



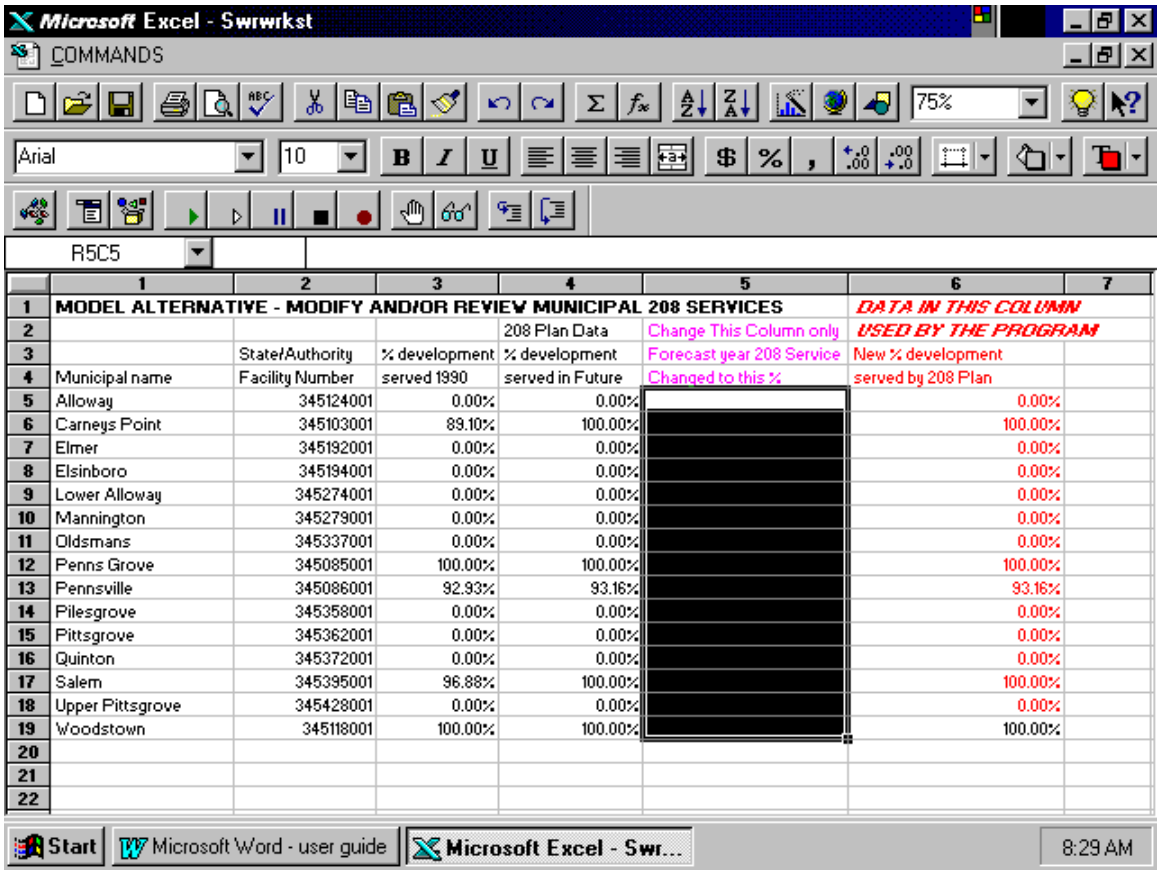
The NJOSP sewer model calculates several types of costs associated with the treatment of sewage. One of these is the cost of improving or building new sewer treatment plants. To determine flows to any treatment plant, the model can use one of two methods. The NJOSP method uses a mathematical model to predict the number of persons and jobs that will be using the system in the future. The model can also use the information supplied in the Waste Water Management Plan (208 Plan). (In fact, the OSP algorithm relies on Waste Water Management Plan information filed with the New Jersey Department of Environmental Protection, so it is important to review this data set.)



Finally, the program asks you to specify sewer service to village centers (this information is used only in the Plan simulation).

B. Municipal Sewer Service Plans

The last sewer variable you can alter relates to the service level forecast to be provided to the residents and businesses in each municipality in the forecast year. You can review this information by clicking on the menu item *Impact Variables* and then scrolling to the command *Municipal Sewer Service Plans*.



	1	2	3	4	5	6	7
1	MODEL ALTERNATIVE - MODIFY AND/OR REVIEW MUNICIPAL 208 SERVICES					DATA IN THIS COLUMN	
2				208 Plan Data	Change This Column only	USED BY THE PROGRAM	
3		State/Authority	% development	% development	Forecast year 208 Service	New % development	
4	Municipal name	Facility Number	served 1990	served in Future	Changed to this %	served by 208 Plan	
5	Alloway	345124001	0.00%	0.00%		0.00%	
6	Carneys Point	345103001	89.10%	100.00%		100.00%	
7	Elmer	345192001	0.00%	0.00%		0.00%	
8	Elsinboro	345194001	0.00%	0.00%		0.00%	
9	Lower Alloway	345274001	0.00%	0.00%		0.00%	
10	Mannington	345279001	0.00%	0.00%		0.00%	
11	Oldsmans	345337001	0.00%	0.00%		0.00%	
12	Penns Grove	345085001	100.00%	100.00%		100.00%	
13	Pennsville	345086001	92.93%	93.16%		93.16%	
14	Pilesgrove	345358001	0.00%	0.00%		0.00%	
15	Pittsgrove	345362001	0.00%	0.00%		0.00%	
16	Quinton	345372001	0.00%	0.00%		0.00%	
17	Salem	345395001	96.88%	100.00%		100.00%	
18	Upper Pittsgrove	345428001	0.00%	0.00%		0.00%	
19	Woodstown	345118001	100.00%	100.00%		100.00%	
20							
21							
22							

If you chose to review the "208 Plan" information, you will be presented with a version of the above input worksheet, but containing information about the county you selected to review. Next to the names of the municipalities in the county, you will see the NJDEP

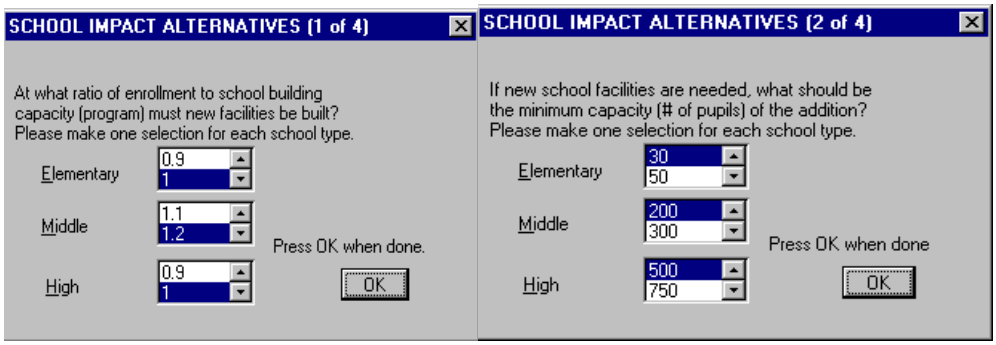
Authority Number for the treatment facility providing service to that municipality (yes, there can be more than one sewer provided for a municipality). The next column shows the percentage of total municipal population that the 208 Plan stated would be provided with sewer collection (and presumably treatment) in the forecast year. You can revise this sewer service forecast by entering new percentages into the highlighted column (which should be the only column that you can write into).

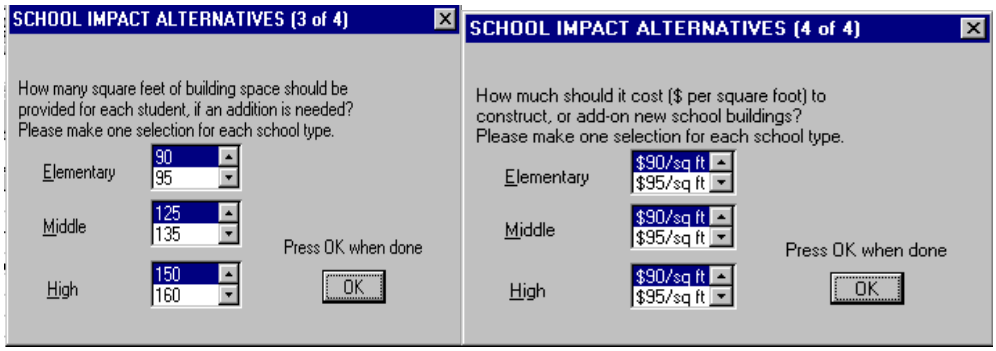
The ability to modify your 208 Plan is intended to provide users with the opportunity to both correct data mistakes (and hopefully reconcile data with NJDEP also) and to allow you to test alternative service plans, in a crude way.

The program produces a report which forecasts the total cost of all sewer capital improvements required from 1990 to the forecast year. You should note that all sewer estimates include any treatment plant costs needed to comply with the Clean Water Act. Therefore, for some systems a higher cost of sewer provision might be estimated due to the requirement to vastly improve the level of service provided by the existing treatment plant(s).

C. School Cost Variables

Click on *Impact Variables* then scroll to *School Cost Variables*. The four user input screens for the School impact model are shown below and should be self explanatory.



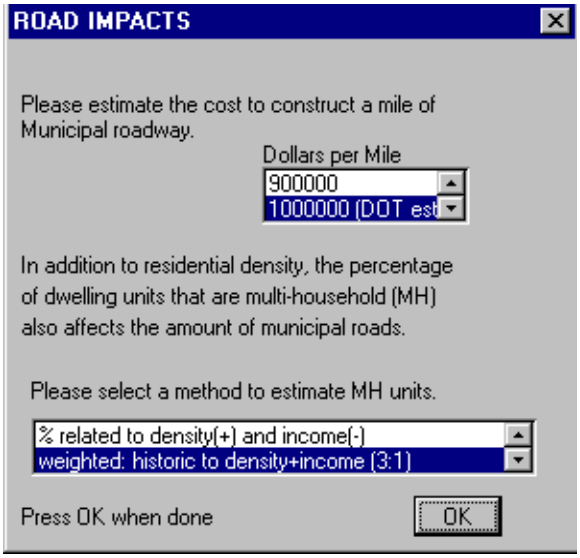


It is important to note that the school model is limited to estimating the total capital costs for new school buildings. Also, it is important to note that program does not know the

condition of any of the existing buildings, nor does the model 'age' the school facilities (like it did with office buildings).

D. Road Cost Variables

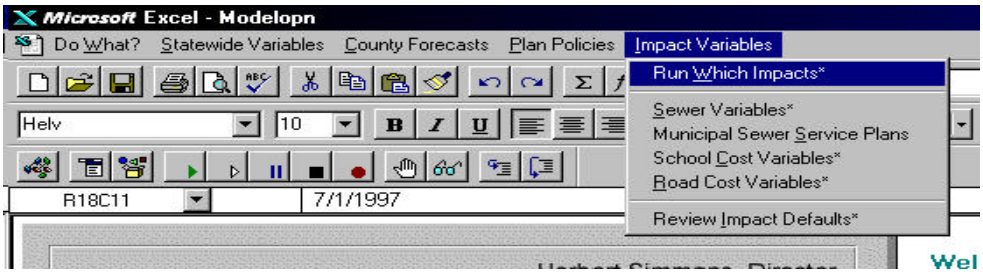
There is only one user screen associated with this impact program. You have to select a cost per lane mile (to construct local roads) and a methodology to estimate the percentage of total dwelling units that are multi family units.



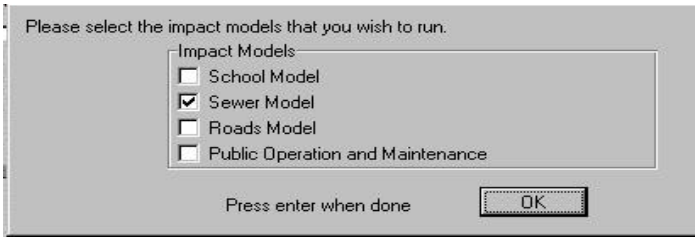
The Roads program does not calculate all capital costs, only those associated with building the new local roads needed to serve the new residential (and non-residential) development.

Selecting Which Impacts to Run

Now that you have completed selecting variables, you need to run each of the impact models separately. You choose to do this by clicking on the menu item *Impact Variables* and scrolling to the command *Run Which Impacts*.



The program then produces the following dialog box with check boxes in which you make your selection.



In the illustration, you can see that the sewer model has been selected to always run with each Trend or Plan simulation.

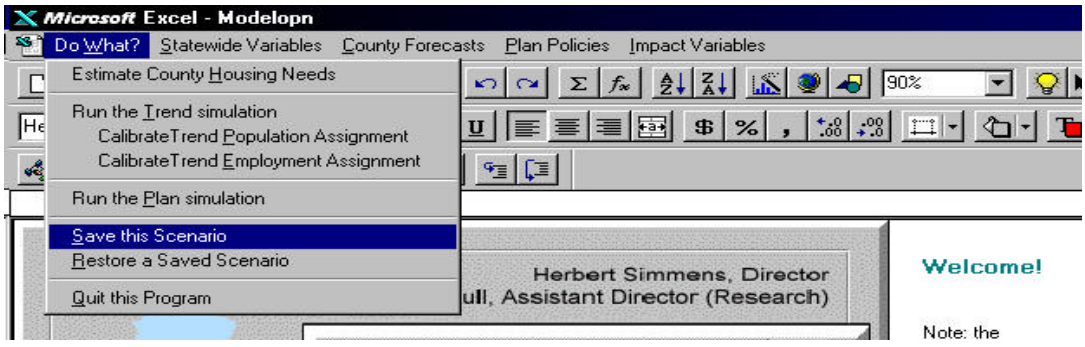
Now run your calibrated Trend simulation and closely evaluate the sewer impact costs that the program projects. If these costs do not seem reasonable, try changing some of the sewer variables. If the costs still appear to be unreasonable, or if one or two towns appear to be really out of line, CALL OSP. There could be errors in these data sets. OSP will be glad to work with you to check for data (or program) errors.

When you have produced a reasonable (but perhaps not likable) estimate of sewer costs, re- select to run only school impacts. Run Trend again and check the results as you did for the sewer model. Finally select to run just the Roads model and check its forecasts.

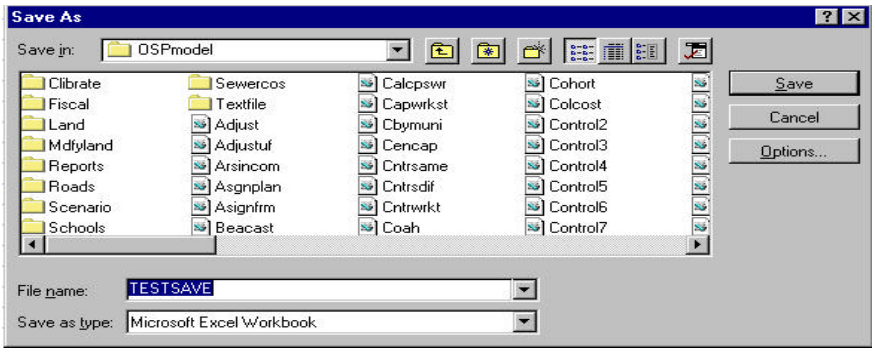
Congratulations! You now have prepared the model to produce a reasonable Trend growth allocation and reasonable impact cost. All this work was necessary so that you could use the model to test Plan simulations.

Fifth - Saving and Restoring Scenarios

Having invested the time to produce a calibrated Trend scenario and tested the impact models, you might wish to save the variables that produced these results. You can do this (or save any set of variables to allow you to replicate any model simulation) by clicking on the menu item *Do What?* and scrolling to the command *Save this Scenario*.



These actions will start a program which first collects the scenario specific values and then copies them to a file titled “testsave”. Rather than saving this file to the (default) OSPmodel directory, it is suggested you create (or use) another directory for this purpose, or that you save these files to diskette.

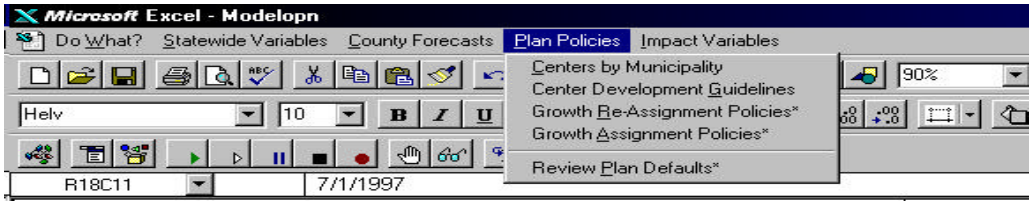


To restore a scenario all you do is click on the menu item *Do What?* and scroll to the command *Restore a Saved Scenario*. This starts a program which prompts you to identify the name and location of the scenario you wish to restore. Once the file has been located the program resets the program’s default values to those contained in the saved file.

The ability to save and restore program variables provides you with more capability that the simple ability to replicate scenarios. This feature can be used to iteratively improve plan scenarios. For example, let’s suppose that you have developed a set of plan policies that produces a generally desirable growth distribution. You might wish to save this ‘generally desirable’ scenario and use it as a starting place for further improvement.

At Last - Running the Plan Simulation

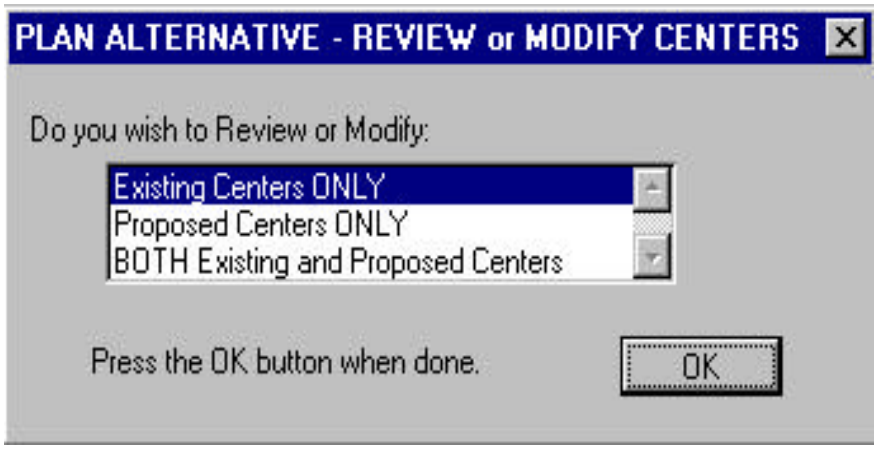
The Plan simulation is determined by policy variables you choose. You can select these values by clicking on the menu item *Plan Policies*. As shown below, there are four groups of plan policies.



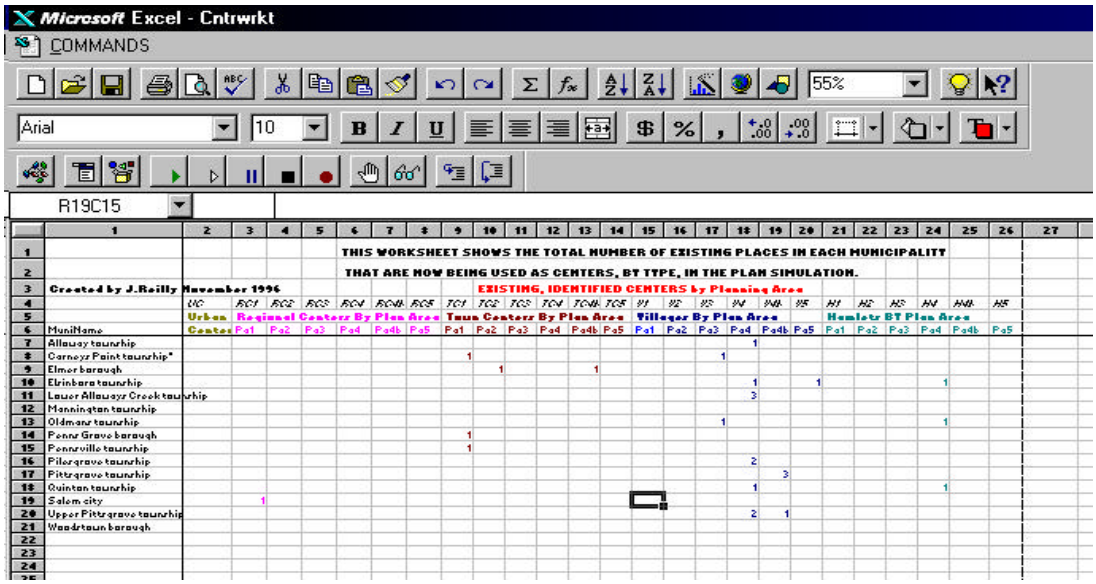
Setting Plan Policy Variables

A. Centers by Municipality

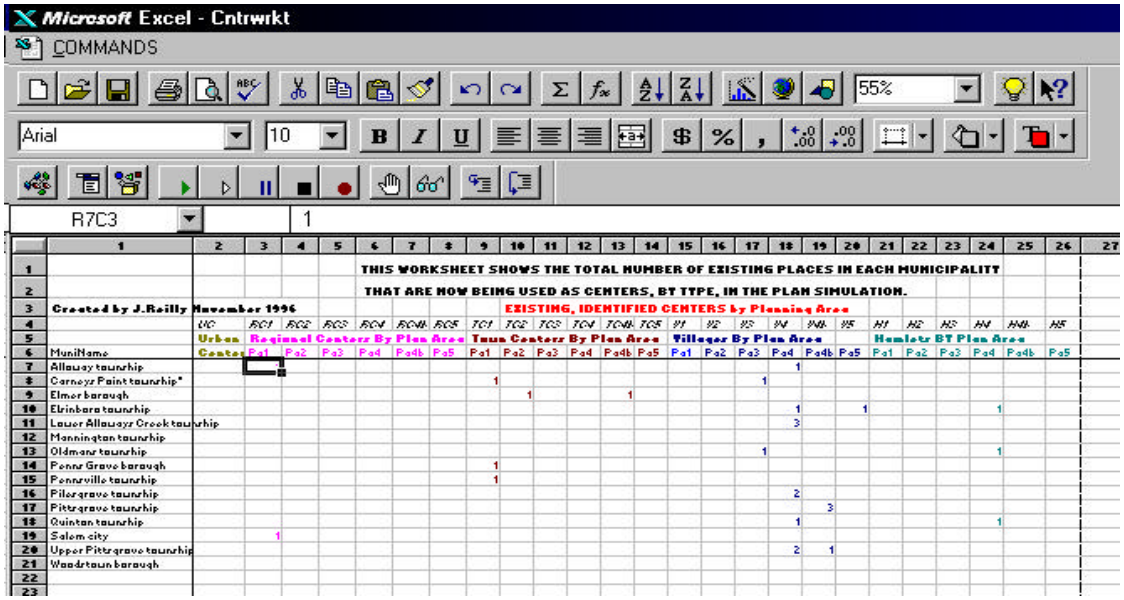
First you need to specify the types and locations of all Centers, if any, that you wish the model to use in the Plan simulation. When you click on the command Centers by Municipality the following a dialog box opens.



You can review or modify the number, location (municipality and planning area) and center typology (what type of center, e.g. village or regional center) for all existing centers and/or for all of the proposed centers in your region. Existing centers refer to place *with some degree of existing development* that you might wish to intensify or preserve by designating that place as a center. The term proposed centers refers to *totally new developments* that would be built between the base year and the forecast year. The inventory of existing center and proposed centers initially used by the program was taken from Appendix C of the 1992 *State Development and Redevelopment Plan*. When you choose to review the list of existing (or proposed) centers, the program compiles a worksheet using these 'identified' centers. As you can see in the following example, showing Salem County existing centers, there is only one Regional Center located in Planning Area 1 (Salem City), while Lower Alloway Creek Township has three villages located in PA4.



You can choose to print this worksheet any time (before you decide to return to the program). you also can make changes to the worksheet simply by entering a new value into any of the cells within the matrix, bounded by municipal names and planning areas. (This should be the only area you can write into.) If you choose to make no changes and click on the menu item *Commands*, *return to program*, no changes will be made. In this example, I have created a new PA1 Regional Center in Alloway Township by entering the number 1 into the appropriate cell, as shown below.



When you are done reviewing and/or modifying the centers and you choose to return to the program, a small checking program runs to see if I have made any changes to the list of existing centers. Since I have added an additional existing center, the program creates a new worksheet comparing all the previously identified Urban centers to the

new list of Urban centers specified in the input worksheet. Then the program creates a similar worksheet for all the centers for each of the planning areas - up to a total of six input worksheets in all. (the program does not create a worksheet if no centers are identified in a given planning area.) The following input worksheet shows the Salem County existing centers located in Planning Area 1.

Microsoft Excel - Capwrkst

COMMANDS

R7C1 | Alloway township

	1	2	3	4	5	6	7	8	9	10	11	12
1	THIS WORKSHEET COMPARES ALL THE EXISTING CENTERS CHOSEN FOR TESTING											
2	AND INFORMATION ABOUT EXISTING RESIDENTIAL DEVELOPMENT.											
3	Prepared by J. Reilly November 1996						<--- Centers now in the program					
4			Centers in PA1				<--- Centers selected for use with this model run					
5							<--- Existing Dus in Centers (does not list urban centers)					
6	MuniName	Urban/Regional Center		Town Center(s)								
7	Alloway township		1			366						
8	Carneys Point township*			1	1	67						
9	Elmer borough											
10	Elsinboro township					301						
11	Lower Alloways Creek township					359						
12	Mannington township					230						
13	Oldmans township					23						
14	Penns Grove borough			1	1							
15	Pennsville township			1	1							
16	Pilesgrove township					261						
17	Pittsgrove township											
18	Quinton township					270						
19	Salem city	1	1			2894						
20	Upper Pittsgrove township					233						
21	Woodstown borough					1347						
22												
23												
24												

What is happening in this worksheet is a kind of consistency checking. The first and third columns (from the left) show the previously ‘identified’ Regional and Town Centers. The columns to the right of these ‘now in the program’ centers shown the new selections. These values are presented as a kind of reference and are not intended for you to modify (which you can not even if you wanted to, other than by re-running this program). The column of interest is the darkest one farthest to the right. By definition, existing centers MUST have some existing development, otherwise by definition that should be classified as PROPOSED centers. Since all centers, except Urban Centers have some maximum capacity, the real purpose of these worksheets is to allow the user to identify the existing development so that it can be subtracted from the center’s capacity limit.

Another purpose of the worksheet is to correct the program’s data set. As you can see, quite a lot of error must exist with the existing (1990) dwelling unit information. For example, Quinton is shown to have 270 dwelling units (presumably in a center), but no existing center has been identified. Also, Alloway (where we just added an existing centers) appears to have had an error since it shows an 360 dwelling units as having

previously been located in some form of center. Now that we are simulating an existing center, we need to decide if this existing dwelling unit estimate should be altered.

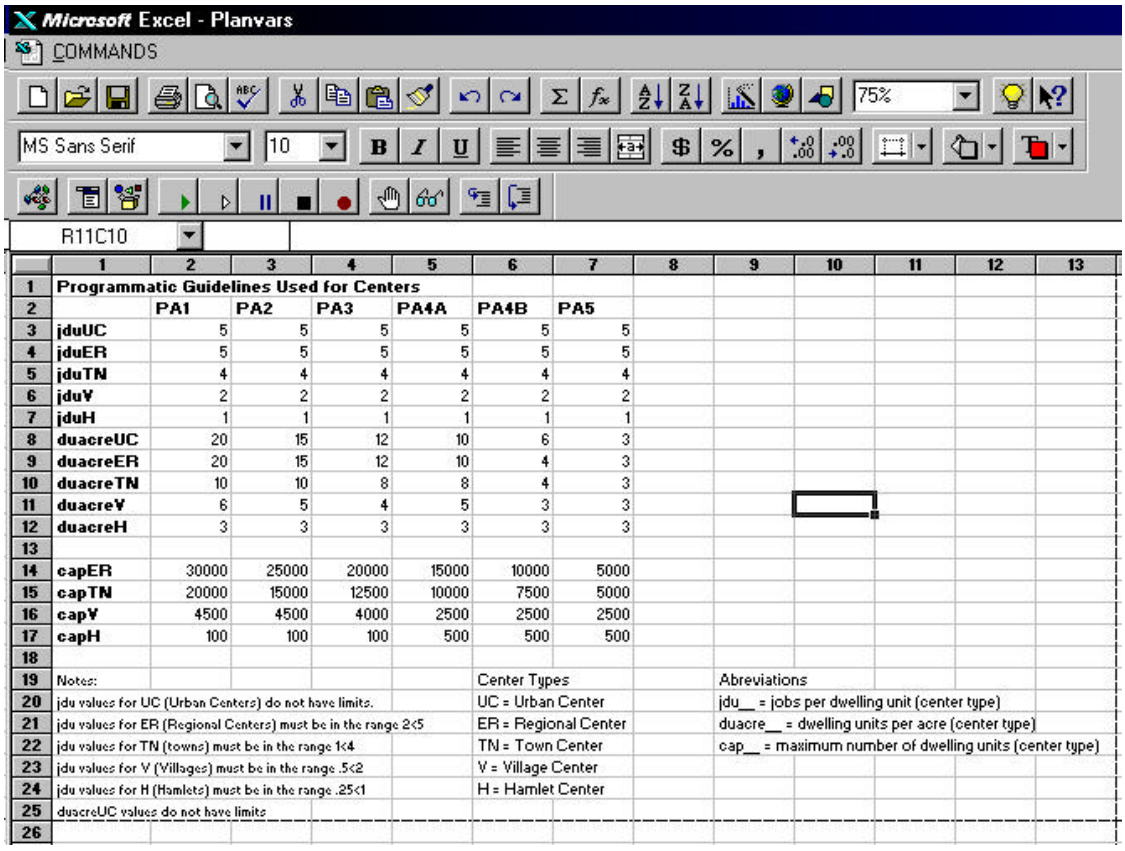
Do not confuse these CENTER SPECIFIC existing population estimates with total municipal population. Unless the center is coterminous with the municipal boundary, it is unlikely that the center(s) population and the municipal population would be identical.

When you are done modifying this worksheet select the command *return to program*. You will be cycled through all of the Planning areas where centers exist. Again all changes you make to these worksheet are saved by the program and become default values, until you choose to change them.

If you choose to identify Proposed Centers, you can do so. The program shows you all of the proposed centers it now is using and allows you to change these values. Since Proposed Centers do not exist (at the 1990 base year) they cannot have anyone living in them, no existing population subroutine will run.

B. Center Development Guidelines

The next Plan policy value determines the density of development and the capacity of centers in your region. You access this input worksheet by clicking on the menu item *Plan Policies* and then scrolling to the command *Center Development Guidelines*.



	1	2	3	4	5	6	7	8	9	10	11	12	13
1	**Programmatic Guidelines Used for Centers**												
2		**PA1**	**PA2**	**PA3**	**PA4A**	**PA4B**	**PA5**						
3	**jduUC**	5	5	5	5	5	5						
4	**jduER**	5	5	5	5	5	5						
5	**jduTN**	4	4	4	4	4	4						
6	**jduV**	2	2	2	2	2	2						
7	**jduH**	1	1	1	1	1	1						
8	**duacreUC**	20	15	12	10	6	3						
9	**duacreER**	20	15	12	10	4	3						
10	**duacreTN**	10	10	8	8	4	3						
11	**duacreV**	6	5	4	5	3	3						
12	**duacreH**	3	3	3	3	3	3						
13													
14	**capER**	30000	25000	20000	15000	10000	5000						
15	**capTN**	20000	15000	12500	10000	7500	5000						
16	**capV**	4500	4500	4000	2500	2500	2500						
17	**capH**	100	100	100	500	500	500						
18													
19	Notes:					Center Types			Abreviations				
20	jdu values for UC (Urban Centers) do not have limits.					UC = Urban Center			jdu__ = jobs per dwelling unit (center type)				
21	jdu values for ER (Regional Centers) must be in the range 2<5					ER = Regional Center			duacre__ = dwelling units per acre (center type)				
22	jdu values for TN (towns) must be in the range 1<4					TN = Town Center			cap__ = maximum number of dwelling units (center type)				
23	jdu values for V (Villages) must be in the range .5<2					V = Village Center							
24	jdu values for H (Hamlets) must be in the range .25<1					H = Hamlet Center							
25	duacreUC values do not have limits												
26													

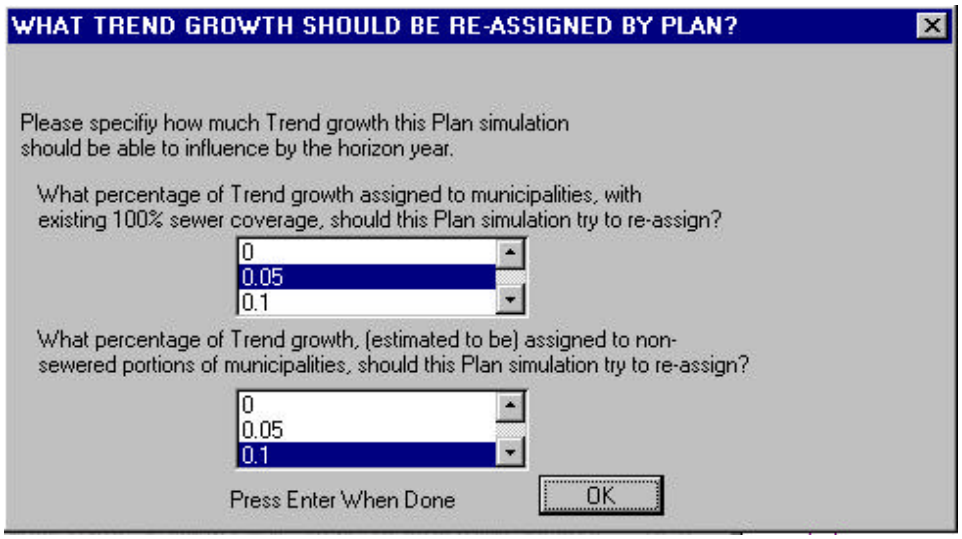
The numeric information in the matrix is used by the program to 'fit' growth into centers. Three development attributes are defined: the job per dwelling unit ratio (*jdu*); the number of dwelling units per acre (*duacre*) and the dwelling unit capacity (*cap*) of each center. For a given type of center different development attributes can be designated for use in each planning area. For example, you can see that dwelling unit density for Towns in PA1 is 10 dwelling units per acre, but that in PA5 the density is 3 dwelling units per acre. Similarly, the capacity is 20000 persons in PA1 but only 2500 persons in PA5.

You need to be aware that these attributes are highly interactive between themselves and other data in the program. For example, if you identify a 'new' existing town center to be located in (hypothetical) Podunk Township's PA5 land and then state that it has an existing population of 2600 persons, the program will not allocate any growth to this center (regardless of available land), since it already exceeds the PA5 town capacity of 2500 persons (a value you select). If you identify a new center (existing or proposed) to Podunk's PA4b land, but the land inventory shows no available developable land in PA4b, then no growth assignment will be made.

Perhaps less obvious is the inter-relationship between jobs per dwelling unit and dwelling unit density. Let us suppose that you have identified a proposed village to be located in Podunk's 20 available acres of PA3 land. Let us also suppose that you specify a job to dwelling unit ratio of 10 and a dwelling unit density of 5. Furthermore, let us assume that you have specified a job density for Podunk that is 2 jobs to the acre. These guidelines mean that for each dwelling unit 10 jobs requiring five acres is also required! This means that the dwelling unit capacity of this 20 acre village is something less than 4 units, since the rest of the land is required for job related development.

C. Growth Re-Assignment Policies

The final two plan command determine what Trend assigned growth may be available for Plan re-distribution and also define how that redistributable growth should be assigned by Plan. First we will look at the policies that determine how much of Trend growth is available for Plan to reallocate. Clicking on the Menu Item *Plan Policies* and the command *Growth Reassignment Policies* produces the following dialog box.



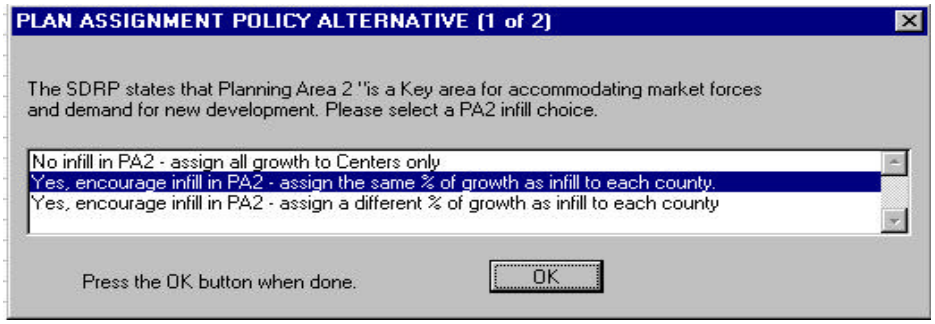
Two policy questions are presented. The first asks what percent of Trend growth would you like to reassign with Plan. (Please note that in this dialog box 0.05 equals 5%.) This seemingly straightforward question is actually rather tricky. For example, the total growth increment may be very small. Let us assume that population growth of 100,000 persons and 40,000 jobs is forecast for a specific county. If we choose to allow Plan to redistribute 10% of Trend growth, this would mean that a MAXIMUM of 10,000 persons and 4000 jobs could be affected by Plan. It could be the case that much of the Trend assigned growth largely conforms to your plan policies. Let's assume that only 5000 persons and 1000 jobs assigned by Trend are in locations where your Plan policies do not want to encourage growth. Then the re-distributive total for the Plan scenario is limited to these numbers (5000 persons and 1000 jobs).

The second question in the dialog box allows you to use a special exception to reassign Trend growth between fully developed and serviced municipalities. In general, Trend growth assigned to such places would not be available for plan re-distribution since the Trend assignment is in conformance to the general Plan policy, which encourages the location of growth to areas with existing infrastructure. However, in the more developed counties many, if not all, municipalities are largely sewered. This policy lever allows you to identify some of this Trend assigned growth and make it available for plan re-distribution.

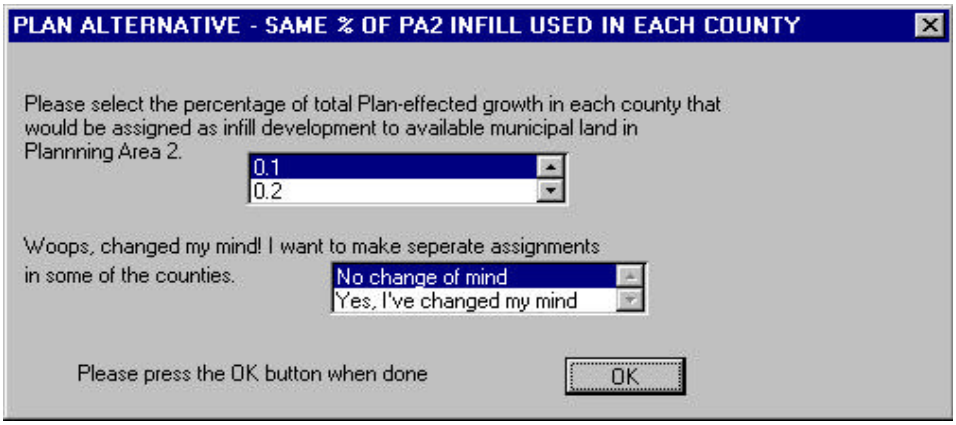
D. Growth Assignment Policies

The final set of Plan policies determine where (and how) plan growth is to be allocated. Clicking on the menu item *Plan Policies* and the command *Growth Assignment Policies* produces two dialog boxes which ask general plan policy questions. Depending on your policy selection, one or more additional dialog boxes or input worksheets may be produced so that you can further specify how Plan is to work.

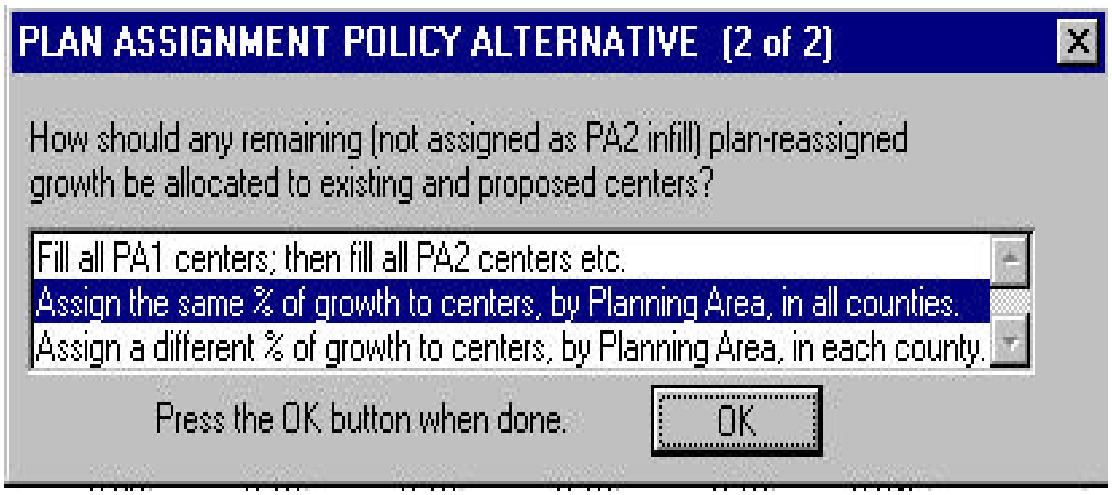
The first policy question if (and to what degree) you wish to encourage (non-center located) growth in PA2.



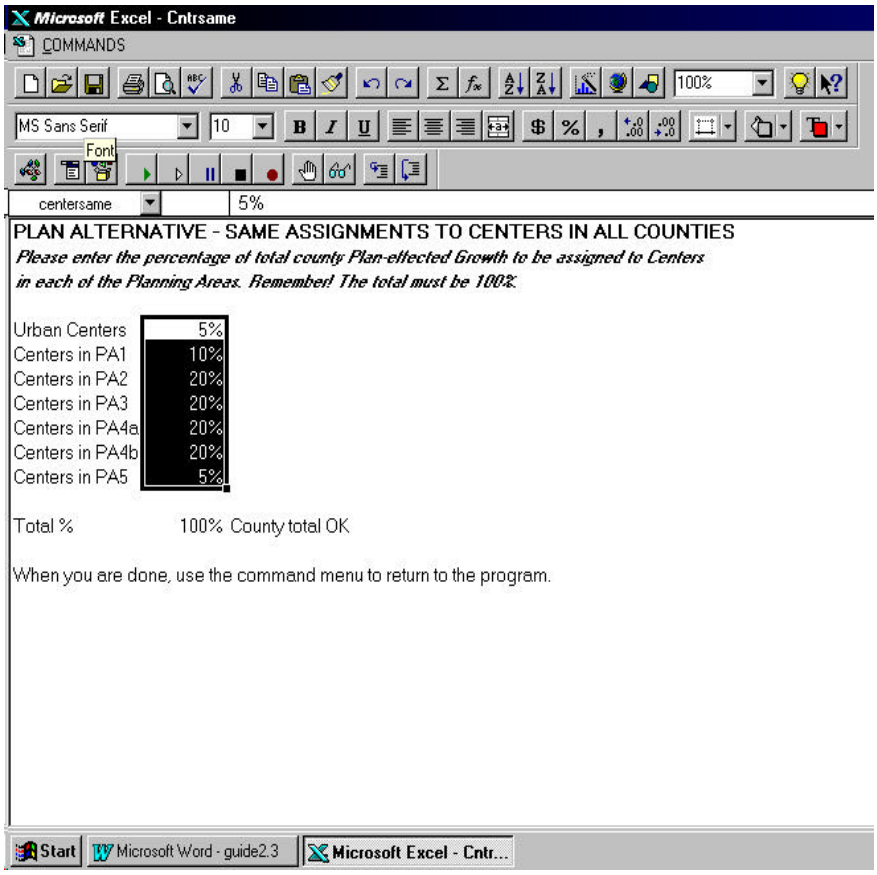
Since, in the above example, you have chosen to encourage infill in PA2, the program produces a second dialog box. In this policy elaboration box, you are asked to identify an infill policy target. The example below shows an attempt to allocate 10% of the total growth available for plan redistribution as infill growth into available developable land located in PA2.



The second policy assignment dialog box then asks how you would like to assign growth to centers. In the following example, the option to assign a specific amount of growth to all of the centers within each planning area has been chosen.



Because of this policy decision, the program produces another policy elaboration input worksheet which allows the user to specify assignment objectives for centers in each planning area. For example, in the following illustration you can see that 5% of the growth that can be affected by Plan is to assigned to Urban Centers. You may wish to establish other policy objectives.



Again, it is important to note that you may not be able to achieve your policy objectives. There may not be sufficient land. The job to dwelling unit ratios may prohibit large

population re-allocation. You may not have enough centers specified. If you are surprised with the results of a plan scenario, you need to check YOUR assumptions, before you assume that the program made a mistake.

V. Evaluating Model Results

To assist you to evaluate the differences between Trend and any Plan scenario, three general methods are recommended.

- First, you should compare the Trend municipal growth allocation with the development goals and Policy Objectives found both in the *State Development and Redevelopment Plan* and with your sense of what growth pattern might be beneficial. For example, Trend might allocate most new growth into the rural portions of the county, a pattern of development you may not wish to encourage. Therefore, you might devise a Plan scenario based on the policy intent of allocating most of the growth into more developed municipalities.
- Second, you should evaluate the Plan scenario to insure that it is effective in achieving your policy intent. For example, if there is insufficient land available to accommodate county growth into the more developed municipalities, your 'Plan' growth allocation may not achieve the policy intent of redirecting growth to the more developed municipalities. (To resolve this problem you might have to 'redevelop' land to increase the supply of available developable municipal land.)
- Finally, the NJOSP Growth Simulation Model includes several impact assessment models to provide comparison benchmarks. For example, you might discover that your plan policy intent of redirecting growth into the more developed municipalities might incur higher high school costs than you anticipated in one municipality. To resolve this problem you might wish to run another plan scenario which slows growth in that place, perhaps by reducing the number of new centers (assumed in the plan scenario) or by reducing the development density for the centers.

The best way to use this model is to run lots of alternatives. *Do not limit yourself* to establishing a single Plan policy scenario and its refinements. Live a little, have some fun, be adventurous. Try different policy mixes. See what happens, it might surprise you! The advantage of the model is that it defines your growth goals in the vernacular of the *State Development and Redevelopment Plan* and allows you to quickly test alternative policy driven scenarios. It also incorporates several GIS and other databases to ensure that data inconsistencies are uncovered and corrected and that growth projections respect resource limitations.

You should recognize that the development of any successful plan (land use or any other type) can only be accomplished by balancing the good effects with the less desirable effects. Every plan is a trade off, ultimately a political negotiation of the values embodied by the constituents who are to be served by the plan (or at least the values of those who participated in the plan's development). Several very important impacts, such as air quality and transportation congestion, are not projected by the NJOSP model, and

the existing impact models are very limited[9]. However, the model's output has been designed so that it can be readily input into other models (provided by consultants, NJDOT, your MPO, or NJDEP) to compute these values. The model does not make any value judgments with regard to impacts. For example, the model makes no attempt to weigh the loss of 20 acres of PA5 compared to another scenario where an extra $100,000 in road costs is incurred. Only you and your constituents can decide these issues.

The process of planning involves the synthesis of different values and interests into a development policy plan. Within this context, the OSP Growth Simulation model is intended to be a tool for you to use to both gain an insight into regional growth (both Trend and Plan). Because the model uses the best available data and performs the growth assignment using statistically defensible (and documented) methods, use of the model should free planners (both professionals and citizen planners) to focus on the policy aspects of regional planning.

Finally, a word of caution about products produced by the model. Growth forecasts produced by the model should be viewed as "reasonable", not perfectly accurate*. The purpose of the model is to test alternative land use policies, not forecast growth.* In fact, the model begins by asking the user to select or enter a growth forecast to be used by the model. Could future events occur to change the accuracy of this selected forecast? You bet! Therefore it is probably more accurate to admit that growth forecasts for any given year are just (educated) guesses, and that they really represent *capacities* for growth that Trend or Plan is to accommodate at whatever year that amount of growth is realized.

[9] For example, the school impact model only calculates a limited estimate of the cost of new school buildings. (Since it does not know anything about the condition of the existing school buildings, it simply assumes that today's existing buildings will always be available.) It does not calculate operating costs for schools nor does it estimate bussing costs.

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Appendix A

Matrix Displaying Which Statewide and County Variables Affect Program Reports

	County Housing Needs	Trend	Plan
Statewide Variables (required)			
Forecast Year and Background Forecasts	**X**	**X**	**X**
Reports for What County or Region	**X**	**X**	**X**
Housing Demand Alternatives	**X**	**X**	**X**
Regional Income Alternatives		**X**	**X**
Office Space Alternatives		**X**	**X**
Land Inventory		**X**	**X**
Development Density Alternative		**X**	**X**
County Forecasts (optional)			
County Population and/or Employment	**X**	**X**	**X**
County Seasonal Housing	**X**	**X**	**X**
County Group Housing	**X**	**X**	**X**
Municipal Housing Densities		**X**	**X**
Municipal Job Densities		**X**	**X**
Municipal Land Inventory		**X**	**X**

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